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ABSTRACT

This collection of curriculum materials is arranged by grade level for each elementary grade. Materials are recommended for use in conjunction with trained volunteer instructors and with access to an outdoor education center, a park, or a wooded area near the school. Level K-3 emphasizes basic observational and process skills, while levels 4-6 emphasize process also, but are not as directive as for grade levels K-3. Activities at all levels include a rationale statement, an instructional objective, a pretest, a list of vocabulary words (when appropriate), background information, instructional procedure, and specific activities. (RE)

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ECOLOGY ENRICHMENT

GRADES 1-6

Developed by
Rocky River City Schools

Gordon E. Rodeen, Superintendent
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INSTRUCTIONAL MATERIALS
EXCHANGE

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SE 029 540

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FOREWORD

The Division of Planning and Evaluation of the Ohio Department of Education is pleased to announce the Instructional Materials Exchange program. This pilot venture is being conducted in cooperation with the following developer school districts:

**Ashland County-West Holmes
Joint Vocational School
Cincinnati Public Schools
Cleveland Public Schools
Columbus Public Schools
Parma City Schools
Rocky River City Schools
Struthers City Schools**

The materials included within the series were developed under grants awarded to the above mentioned school districts by the Division of Planning and Evaluation during the past two years.

The Instructional Materials Exchange has been initiated so that more Ohio school districts can benefit from developmental project efforts by adopting practical educational products and ideas into their systems. If this pilot effort is successful, as evidenced by sufficient numbers of educators requesting materials, the dissemination effort will be expanded to include a greater variety of educational products.

The products included in this program were selected for use by Division staff members on the basis of effective field test results and the potential of the products to be used by a greater number of schools. Distribution is being made to schools without charge as long as a supply remains available.

To permit the maximum number of schools to participate, the volume of materials that may be obtained has been limited. Permission is granted by the Ohio Department of Education and the respective school districts, however, for local reproduction of the materials in any quantity desired. Reproduction beyond the intended scope of this program, such as for commercial distribution, is prohibited.

We welcome your comments regarding the materials provided, as well as your recommendations for future inclusions of products and ideas within the Instructional Materials Exchange program.

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USE OF MATERIALS

The K - 3 level materials included in this manual were designed to support *Science A Process Approach* (S. A. P. A.), an elementary school science program initially developed by the American Association for the Advancement of Science.

At levels K - 3, S. A. P. A. emphasizes the basic process skills identified as:

- | | |
|----------------------------------|-----------------|
| — observing | — classifying |
| — using space/time relationships | — communicating |
| — using numbers | — predicting |
| — measuring | — inferring |

The K - 3 activities represent an attempt to extend these basic process skills to practical ecological field studies.

Student worksheets may be removed and duplicated for student use. The drawings are large enough to permit coloring and duplicated material may also be taken into the field and serve as a student reference. These worksheets can also serve as a pretest or post test; a space is provided on each worksheet to check the student's achievement. A smile or a frown may be drawn into the face of the symbol found in the evaluation block to indicate the degree of success the student achieves.

Levels 4 - 6 activities are also designed to be process oriented, but the processes are not as clearly identified as they are at levels K - 3. Some of the 4 - 6 activities, such as "Minor Investigations", can be completed in a short class session, while other activities such as "A Study of Soil" may be conducted over a period of several weeks.

To effectively use these curriculum materials, an outdoor education center, a park, or a wooded area near the school should be available for class use. Any area that supports wildflowers and a good selection of trees can serve as the outdoor laboratory.

To implement this curriculum, the developer district trained adults and 5th and 6th level students to serve as volunteer instructors. The use of such instructors permits a teaching situation in which two to five students are supervised and instructed by one volunteer. It is recommended that school systems planning to use any portion of this program should explore the possibility of training and utilizing volunteer personnel.

ECOLOGY LEVEL K

A Note to ALL Helping With Ecology Level K

The following pages are filled with background material, ideas, and activity sheets for the Level K teacher to correlate with her S.A.P.A. Science Manual A. The activity sheets have been so designed to provide ample room for the children to color them. Encourage the children to do this, for it is another way to make students aware of the colors in Nature and help them to become more astute in their observations.

If at any time the teacher feels the student knows the subject matter, move him on to the next activity or on to the next grade level. Some activities have post tests. When the student successfully completes the activity the teacher or accompanying adult will put a "Smile" on the face of the Sunflower. This sunflower will be found on all Level K activity sheets.

We hope you use and enjoy the following material. We tried to make it as convenient and usable as possible.

CLASSIFYING: Leaves and Trees

Rationale:

Classifying is a basic skill in science as well as other areas of study. Sorting and arranging require sufficient study of a material so that similarities and differences can be noted. On the basis of these differences, specimens can be classified. It is our hope that Level K children will become familiar with five trees of the Outdoor Education Center and begin building knowledge of the world of Nature.

Instructional Objective:

Given instruction in the O. E. C., the student will be able to identify these trees: sassafras, tulip poplar, oak, maple, and willow.

Pretest:

Prior to instruction, hold up pictures of the above trees and ask children to identify them. This can be done in the classroom.

Vocabulary:

erosion, lobes

Background:

SASSAFRAS TREE This is a tree that tastes good and smells lemony. The best taste is in the root. The Pioneers boiled the root and made a tasty tea. Oil from the sassafras tree is used in soaps and rubbing lotions. The sassafras tree has four different shapes of leaves. The leaves look like mittens. This tree is beautiful in the fall. Its leaves turn orange, red and yellow. It can grow in poor soil, where other trees cannot.

TULIP TREE This tree is also called yellow poplar or tulip poplar. It is one of the tallest and handsomest trees of the forest. It grows to over 100 feet tall. It has a large greenish-yellow flower; the leaves are the shape of a tulip. Its seeds are eaten by squirrels and songbirds. Its fine wood is used in furniture. It is a member of the magnolia family.

WILLOW The willow tree grows beside a lake, a riverbank, or in moist areas, as in the O.E.C. It helps to prevent erosion. It is easy to recognize for its long narrow leaves. The wind shapes a willow tree; the tree bends in the direction the wind is blowing. Some willows have branches that droop and they are called "weeping willows". The wood of this tree is used for fuel, charcoal, posts, and in medicine.

OAK The oak is a strong, sturdy tree that grows slowly, and the wind does not bend it. It is a tall tree of the shady forest and is often found on hill-sides and slopes. The oak leaf is generally lobed and changes color three times a year: it is green in summer, red in the fall, and brown in the winter. There are many kinds of oaks; all have acorns.

A story to tell the children

OAK When you see a tall oak in the forest, it may be that a squirrel had been there. He may have carried an acorn and buried it. If the squirrel forgot the acorn and didn't dig it up, perhaps a small tree started to grow. This may have happened a hundred years ago.

MAPLE Maples are easy to identify for their leaf has three deep-cut lobes. If we spread our fingers as wide apart as we can, our hand will look something like a maple leaf. In the fall the maples leaves turn to red, orange, and yellow making our yards and countryside very beautiful. All maples have seeds with wings that hang in pairs. There are many kinds of maple trees, but one common maple is called the sugar maple.

A story to tell the children

SUGAR MAPLE A sugar maple tree brings farmers out of their warm houses in very early spring and late winter, when the snow is still on the ground. They wrap up in warm clothes and go out to drill holes in the gray tree trunks. The sap that drips out of the holes is caught in buckets. The farmer boils the sap down until it makes a thick syrup. We call this "maple syrup" and many of us like maple syrup on our pancakes and waffles. Maple sugar candy is also very good.

Instructional Procedure:

Prior to this activity, teach the unit on Classifying: Leaves, Nuts, or Shells in your S.A.P.A. Science Manual A.

Activity

- #1. Each student is given a dittoed print of the five trees to be identified. The trees are the sassafras, tulip poplar, oak, maple, and willow. While in the field, the youngster will compare the drawings to the actual tree found along the hiking trail. When the student successfully completes the activity, the accompanying adult will put a "Smile" on the face of the sunflower.

CLASSIFYING Leaves and trees

Activity Sheet #1

NAME _____

look for these trees

1. sassafras tree



2. tulip poplar



Post test #1

I know these		
1.		
2.		

CLASSIFYING Leaves and trees

Activity Sheet #1

NAME _____

look for these trees

3. willow

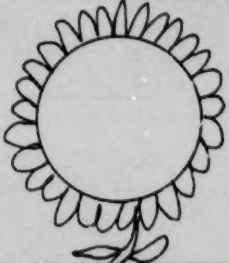


4. maple



I know these

Post test #1

3.		☐	
4.		☐	

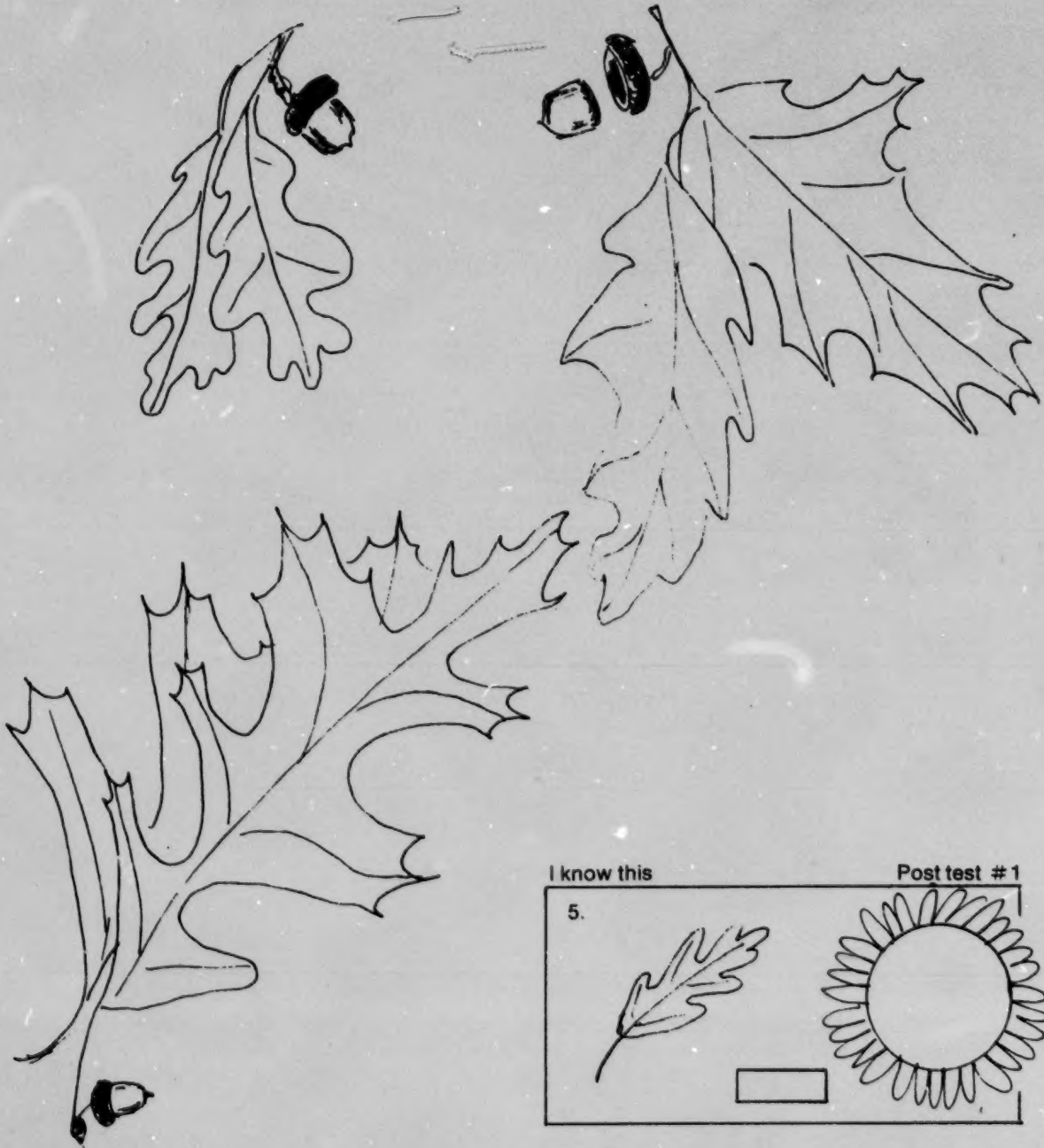
CLASSIFYING Leaves and trees

Activity Sheet #1

NAME _____

look for these trees

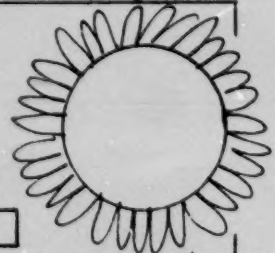
5. oak



I know this

Post test #1

5.



CLASSIFYING:

Wildflowers

Rationale:

We want to begin in Kindergarten developing an awareness to the fragile beauty found in nature. It is our hope that each year the student will add to his previous knowledge.

Instructional Objective:

Given instruction in the O. E. C., the student will be able to recognize these four wildflowers: spring beauties, marsh buttercups, adders-tongues, and violets.

Pretest:

Prior to instruction hold up pictures of the above wildflowers and ask students to identify them. This can be done in the classroom.

Vocabulary:

Wildflower, creeper, erect, meadow, cultivation

Background:

A *WILDFLOWER* May be defined as any plant which grows without aid of cultivation. Wildflowers live in all areas as far North as the Arctic or South in the Tropics.

SPRING BEAUTIES This flower is found in the open woods. It has a delicate pink to white flower veined with deeper pink. It only remains open to bright light and grows to twelve inches high. These plants have starchy bulbs which the Indians use to eat. They bloom in early Spring.

MARSH BUTTERCUPS This pretty bright yellow flower grows in low moist places, meadows or marshes. It can be a "creeper" or stand erect. It is seen in lawns or meadows from spring to fall.

ADDERSTONGUES This flower belongs to the lily family and blooms early in Spring. It has a delicate, small, lily-like flower in yellow, violet or white, and grows in the moist woodlands.

VIOLETS This is a low leafy plant with a pretty delicate flower ranging in color from white to blue to very deep purple. Not all violets have the typical heart-shaped leaf, some have deeply indented narrow leaves. Violets grow in the woodlands and are found in many states. They have a very nice fragrance and make a lovely bouquet.

Instructional Procedure:

Prior to taking your field trip to the O. E. C., show students colored pictures of the above wildflowers.

Activity:

- #2. Each student is given a dittoed print of the four wildflowers to help in identification: spring beauties, marsh buttercups, adders-tongues, and violets.

CLASSIFYING:

Leaves — Poison Ivy

Rationale:

It is important that every student be familiar with Poison ivy and its harmful effects. The Outdoor Education Center has a bountiful supply of poison ivy; however, areas immediately adjacent to all trails have been sprayed and poison ivy is now under control.

Instruction Objective:

Each student will recognize and point out poison ivy.

Pretest:

Show students a picture of poison ivy. Ask them if they can identify the plant.

Vocabulary:

irritate, vine, rash

Background:

Poison ivy is a shrub or climbing vine that is easily recognized when in leaf. The plant has three shiny leaflets that are approximately four inches long. Poison ivy has a white flower in spring and

white or gray berries in summer. Over 60 kinds of birds eat its fruit and spread its seeds over the countryside.

Contact with this plant usually results in itching and other symptoms within three to five days. Wash hands with a good strong soap after touching leaves.

Instructional Procedure:

When you show children a print of poison ivy, mention that they will find other plants with leaves in groups of three. For safety, youngsters should know the old saying "Leaflets three, let it be."

Activity:

- #3. Each student is given a dittoed print of poison ivy to help him in identifying the plant when in the field.

CLASSIFYING Wildflowers

Activity Sheet #2

NAME _____

look for these wildflowers

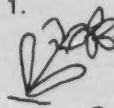
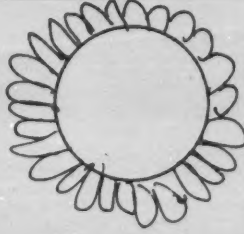
1. spring beauties

2. marsh buttercups



I know these

Post test #2

1.			
2.			

CLASSIFYING Wildflowers

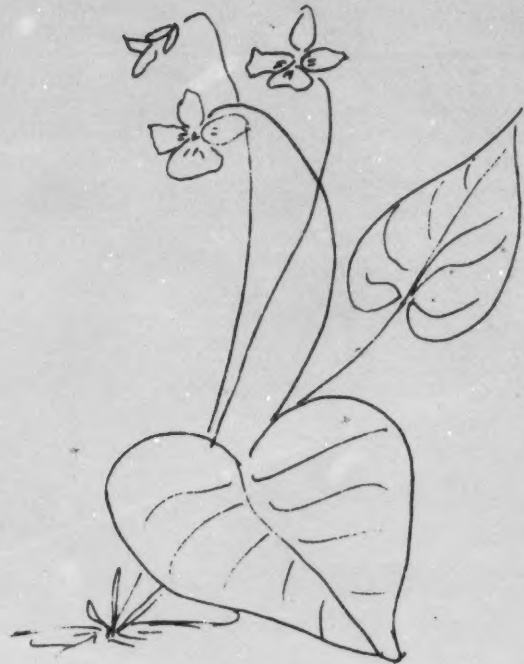
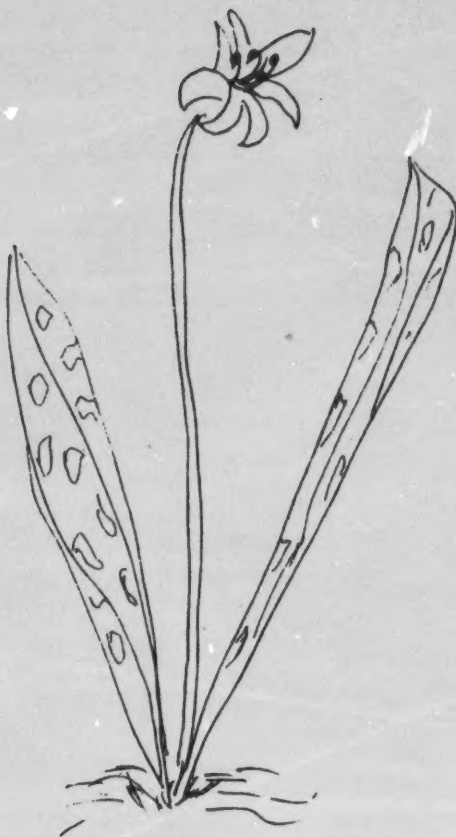
Activity Sheet #2

NAME _____

look for these wildflowers

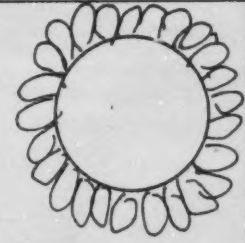
3. adderstongues

4. violets



I know these

Post test #2

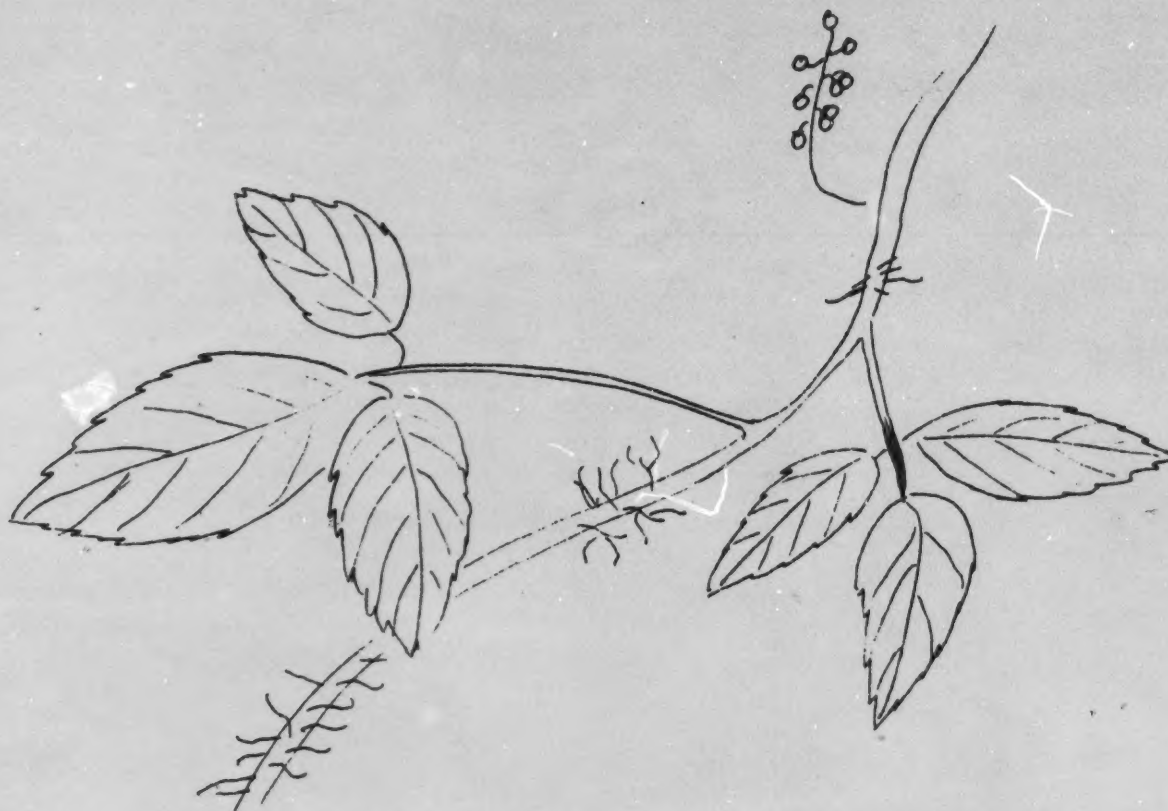
3.			
4.			

CLASSIFYING Leaves—Poison Ivy

Activity Sheet #3

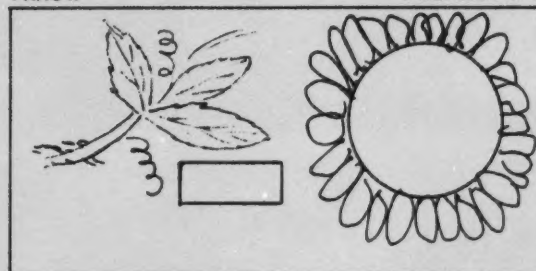
NAME _____

look for the poison ivy



I know

Post test #3



CLASSIFYING:

Birds

Rationale:

Children should be aware of the importance of birds to our ecology. Children can begin as early as kindergarten to become acquainted with a few birds of O. E. C.

Instructional Objective:

Given instruction at the O. E. C., the student will recognize these five birds: robin, blue jay, cardinal, pigeon, and crow.

Pretest:

Prior to instruction hold up pictures of the above birds. Ask students if they can identify them. If they are familiar with these birds go on to Activity # 5 or on to the list of birds for Level 1.

Vocabulary:

beak

Background:

ROBIN This is a very common bird to our area. He belongs to the Thrush Family. His average length is ten inches. The robin has two families a year. He builds a sturdy nest and lays three to four pretty blue spotted eggs. He eats insects, worms, wild fruits, and seeds. He leaves early in November for the South, and arrives back here in March. He is considered by many as a "sign of spring".

BLUE JAY This bird is easy to spot with either your eyes or your ears. He is the noisiest bird of Northern Ohio. His call is a loud squawk. He is bright blue and black with a white breast and a tuft of blue feathers on his head. He eats nuts, corn, grain, insects, and eggs.

CARDINAL This is the bright red bird with the cheery song that we hear in Northern Ohio all year long. The male is bright red, the female is smaller and a duller red. The cardinal is the only red bird with a crest. He eats berries, seeds, and many insects.

PIGEON This bird is very common to the cities. It nests anywhere it can find a ledge. The pigeon is a handsome, colorful bird, about 15½ inches long. He has a broad fan-like tail and eats corn, oats, and other seeds.

CROW This is a large black bird that flies through the air calling "caw caw". He is 17 to 21 inches in length. He eats corn, grain, fruits, seeds, and insects.

Instructional Procedure:

Before going to the O. E. C., show the students colored pictures or filmstrips of the above birds. If your library has records of bird calls, have students listen to them.

Activity:

4. Each student is given a dittoed print of the above birds to help them in identification.

CLASSIFYING Birds

Activity Sheet #4

NAME _____

look for these birds

1. robin



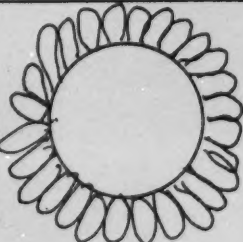
2. blue jay



I know these

Post test #4

1.		
2.		



CLASSIFYING Birds

Activity Sheet #4

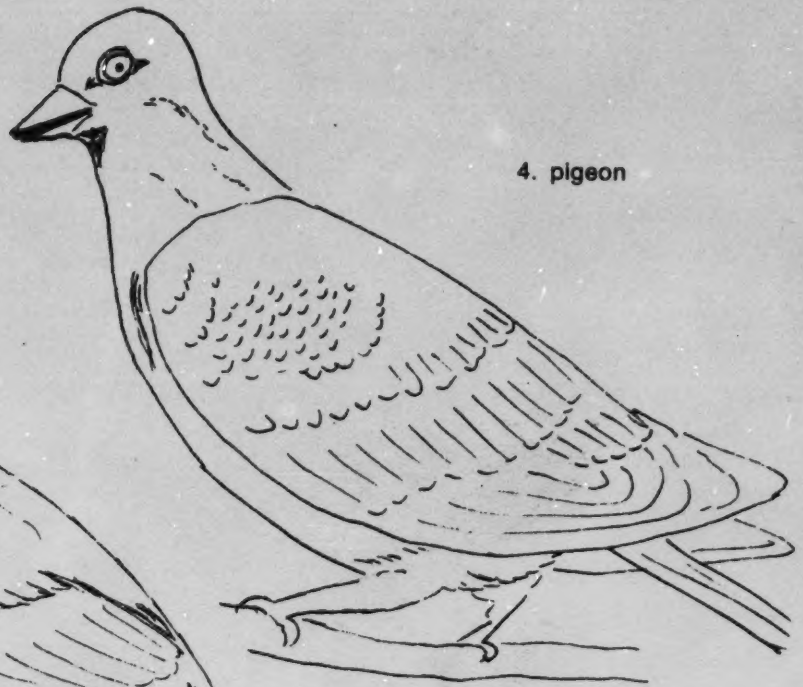
NAME _____

look for these birds

3. cardinal



4. pigeon



I know these

Post test #4

3.			
4.			

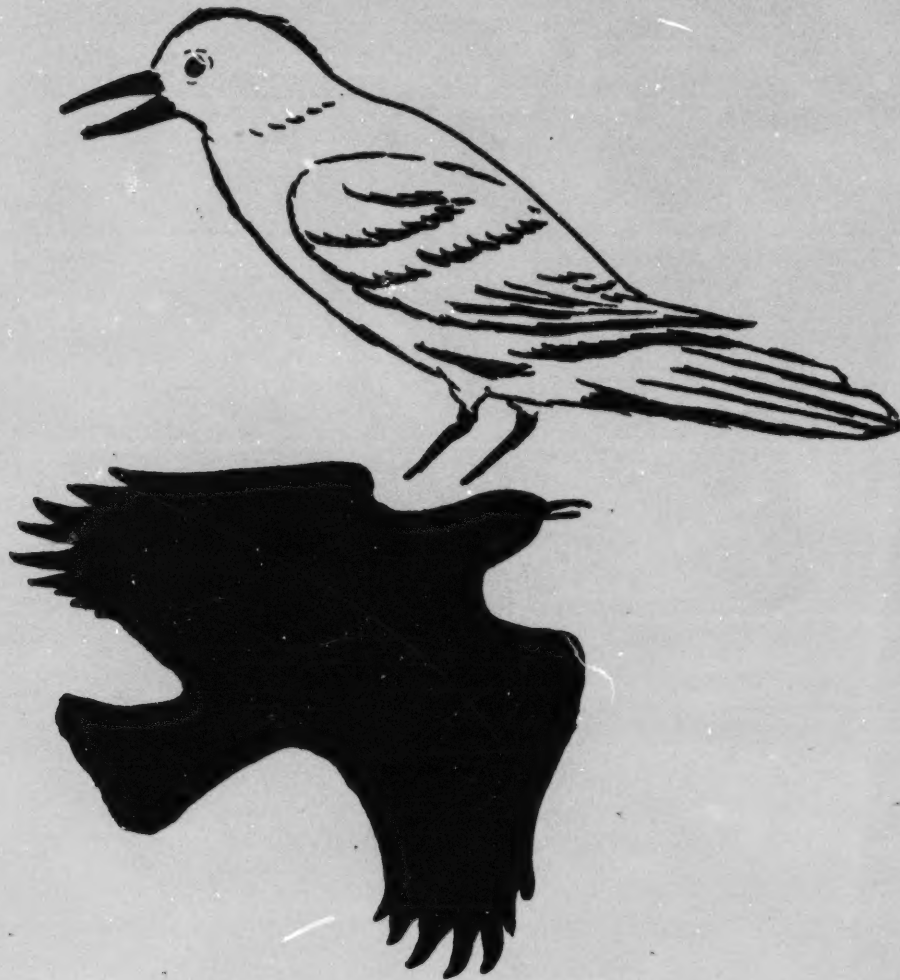
CLASSIFYING Birds

Activity Sheet #4

NAME _____

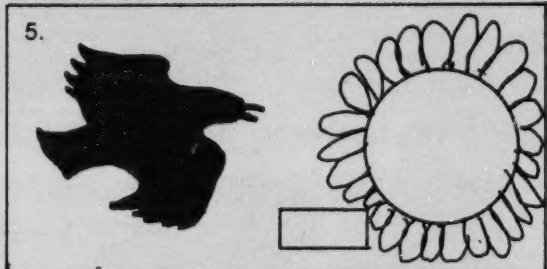
look for these birds

5. crow



I know this

Post test #4



20

CLASSIFYING: Animals — Squirrels

Rationale:

To become acquainted with the animals that live in the O.E.C.

Instructional Objective:

Given instruction, the student will be able to describe and give three facts about the habits of the squirrel.

Pretest:

Ask students what they know about the squirrel.

Background:

FOX SQUIRREL This is the largest of all our squirrels. It is also the squirrel most likely to be seen in our O.E.C. and in the backyards of Rocky River. His long bushy tail helps him keep his balance as he jumps from tree to tree.

he likes to make his home in a hollow tree: but at the O.E.C., his home is often made of dried twigs and leaves and is located near the trunk of larger trees.

His tracks can be seen at the O.E.C. in winter. At this time he is usually searching and digging for nuts that he buried in the fall.

Walnuts, hickory nuts, acorns, maple seeds, and other seeds provide an ample food supply for all squirrels making their home in the O.E.C.

RED SQUIRREL The smallest of all squirrels, it is not more than 12 or 13 inches long. Its fine bushy tail makes the animal seem larger. The red squirrel can also be found in the O.E.C. It feeds on nuts and is very fond of pine cones.

GRAY SQUIRREL This squirrel is found in Ohio, but not at the O.E.C. It is grayish in color and slightly smaller than the fox squirrel. The gray squirrel likes to travel on the ground but is a good climber.

Instructional Procedure:

Prior to your trip to the O.E.C., discuss the fox squirrel and red squirrels with the children.

Activity:

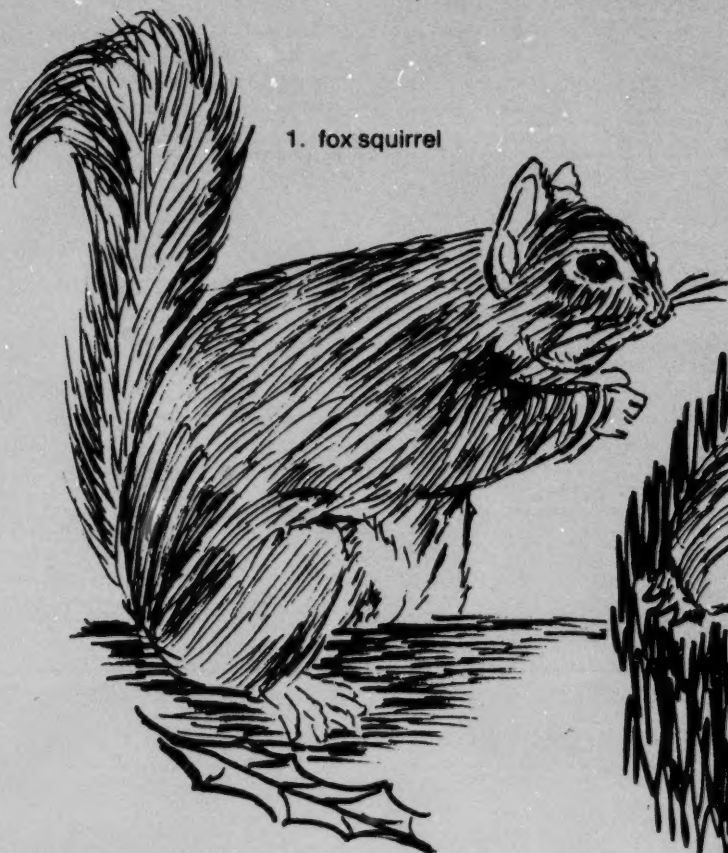
- #5. Give the children a dittoed print of the fox squirrel and red squirrel to help them in identification.
 - a. Have children color ditto before trip.
 - b. As you enter and leave the O.E.C., you will pass several hollow trees with squirrel nests inside. Encourage the children to keep their eyes open and you may see a squirrel peeking out at you.

CLASSIFYING Animals—Squirrels

Activity Sheet # 5

NAME _____

look for these squirrels



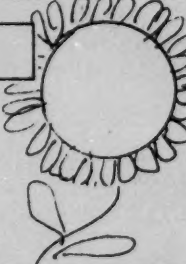
1. fox squirrel



2. red squirrel

Post test # 5

I know a		
I can tell 3 things about a		
1.		
2.		
3.		



OBSERVING I: Senses — Touch

Rationale:

As preparation for later work in science, each student should be aware of the importance of his senses in gathering information.

Instructional Objective:

By touching leaves, stems, and barks of trees, the student will experience and describe the meaning of the words rough, smooth, fuzzy, prickly, and thorny.

Pretest:

Not needed.

Vocabulary:

rough, smooth, fuzzy, prickly, thorny

Activity:

- #1. While you are out in the field, have the student feel the leaf of the American elm tree. (#30, #40, #56, #61, #76, #97, #104, #106.)
 - a. Ask the student to describe how it feels.
- #2. Have each student feel a sassafras leaf. (#17, #67, #113)
 - a. Ask the student to describe how it feels.
- #3. Have each student feel a raspberry or blackberry bush.
 - a. Ask the student to describe how it feels.
- #4. Have each student feel the trunk of a shag-horn hickory tree.
 - a. Ask the student to describe how it feels.
- #5. Have each student feel the stem of a sweet gum tree.
 - a. Ask the student to describe how it feels.*

Post test:

Not needed.

*No student activity sheet for this lesson.

OBSERVING II: Senses — Smell

Rationale:

To increase the child's power of observation by developing his ability to use his sense of smell to identify odors.

Instructional Objective:

By smelling leaves, twigs, and blossoms, each student will become more aware of the outdoor smells.

Pretest:

Not needed.

Vocabulary:

lemony, mint, fragrance, odor

Activity:

- #1. Break a sassafras twig in half. (#17, #48, #67) Let the children smell it.
 - a. Ask the children to describe how it smells.
- #2. Find some mint along the trail.
 - a. Ask the student to describe how it smells.
- #3. Have the students sit quietly on one of the benches.
 - a. After a few moments, ask them to describe any odors that they smell.
- #4. Point out any bushes, shrubs or trees that may be in bloom.
 - a. Ask students to describe their fragrance.*

Post test:

Not needed.

* No student activity sheet for this lesson.

OBSERVING III:

Sound

Rationale:

Listening to sounds is a very important way of learning about one's environment.

Instructional Objective:

To make the student aware that he can make distinctions among various types of sounds and that he can learn to identify events and objects in the environment by the sounds associated with them.

Pretest:

Not needed.

Vocabulary:

shrill, loud, soft, silence, low, high, pitch

Activity:

- #1. Find a bench or picnic table and have the students sit quietly and just listen to their surroundings.
 1. Pass out activity sheet #1. Have the students put an X by each sound that they hear.
 2. Permit students to discuss the sounds that are heard.

OBSERVING Sound

Activity Sheet #1

NAME _____

























Post test #1

I  _____ sounds?
(how many)

USING NUMBERS: Sets and Their Members

Rationale:

To help children realize the presence of numbers in Nature; to make them aware that numbers are an integral part of science.

Instructional Objective:

To give the student additional practice in working with sets and to further develop the idea of numbers and counting.

Pretest:

Not needed.

Vocabulary:

insect

Instructional Procedure:

Prior to going to the O.E.C. teach the lesson *Sets and Their Members* in the S.A.P.A. Science Manual A. You will also have worked with sets in their math workbook.

Activity:

- # 1. Have the children find:
 - a. A set of three different seeds.
 - b. A set of six different leaves that are larger than their little finger.
- # 2. Have the children look for insects.
 - a. Have the students count the legs of the insects. Insects have six legs.
 - b. Have the students count the insects that they have collected.
- # 3. Ask the students if they have noticed any numbers at the O.E.C.? If the students didn't notice that the trees were numbered, point it out to them.
 - a. Have them count out loud as they move along the trail.*

Post test:

Not needed.

*No student activity sheet for this lesson.

ECOLOGY LEVEL 1

27

A Note to ALL helping with Ecology Level I

The following pages are filled with background material, ideas, and activity worksheets for the Level One teacher to correlate with her S.A.P.A. Science Manual B. The worksheets have been so designed to provide ample room for the children to color them. Encourage the children to do this, for it is another way to make students aware of the colors in Nature and to help them become more astute in their observations.

If at any time the teacher feels the student knows the subject matter, move him on to the next activity or on to the next grade level. Some activities have post tests. When the student successfully completes the activity, the teacher or accompanying adult will put a "Smile" on the face of the "Leaf". This leaf will be found on all Level I worksheets.

We hope you use and enjoy the following material. We tried to make it as convenient and usable as possible.

CLASSIFYING:

Observing Living and Non Living Things

Trees

Rationale:

If youngsters identify a minimum of five trees each year, they will have become familiar with 35 trees in grades K-6.

Instructional Objective:

Given instruction in the Outdoor Education Center, the student will be able to recognize a minimum of five trees (Shagbark Hickory, American Linden, Black Locust, Staghorn Sumac, White Pine) found on the site.

Pretest:

Prior to instruction, hold up pictures of the above trees. Ask students if they can identify them.

Vocabulary:

Shagbark Hickory, American Linden, Black Locust, Staghorn Sumac, White Pine, needles, simple leaf, compound leaf, resin, evergreen.

Background:

SHAGBARK HICKORY This tree is easy to recognize for it has the shaggiest of all barks. The tree grows slowly and has tough wood. It is used for handles on axes, hammers, and it makes fine skis. The leaves are large, smooth on top — hairy on the bottom. There are five leaflets. The three on the tip are much bigger. (See sketches on Activity Sheet #1). In the fall the leaves turn rusty and yellow. The nuts it bears are hard to crack, but delicious.

AMERICAN LINDEN

This tree is also called the Basswood tree. The linden does not stand alone in the woods. It almost always has a young one sprouting at its base. The leaves are heart-shaped and lopsided with a saw-toothed edge. The flowers are small, but the bees always find them. In June there may be so many bees around this tree, that it sounds as though it was humming. The honey is dark and good.

BLACK LOCUST This is a tall, graceful tree that smells heavenly in late May, when its flowers are in bloom. Its wood is hard and farmers use it for fence posts because it does not readily decay. This tree is not good for climbing because it is covered with thorns and its branches break easily. The leaf of the black locust tree is compound with each leaflet having a well-rounded end.

STAGHORN SUMAC This is a short tree that is easy to recognize for at the end of its branches are thick bunches of hairy red berries. If you pick a berry and lay it on your tongue, it will taste sour. The leaves on the leaflet are long and feather-shaped with a saw-toothed edge. At certain times of the year, a stag deer has a velvet cover on his horns. A similar velvet cover is found on the end of a staghorn sumac stem, perhaps this is why the tree was given its name.

WHITE PINE The White Pine grows tall and straight. The needles of this pine grow in bundles of five. The cones are long and curved. When you touch them you will feel drops of a sticky juice called resin. You can shake the seeds out of the cone. Each seed has a little wing that helps it sail on the wind. The White Pine is an evergreen.

Instructional Procedure:

Before students go out into the field, show them pictures of the trees you want them to learn. Also review the trees from Kindergarten: Sassafras, Tulip Poplar, Oak, Maple, and Willow.

Activity

- #1. Each student is given a ditthe trees to be identified. While in the field, the student will compare the drawings to the actual tree found along the hiking trail at the O.E.C.

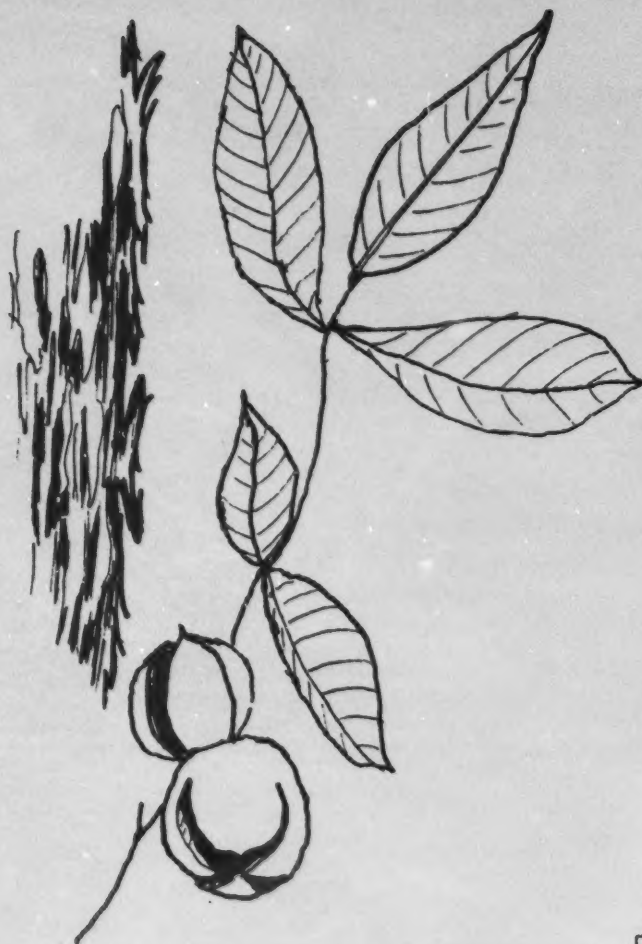
CLASSIFYING Trees

Activity Sheet #1

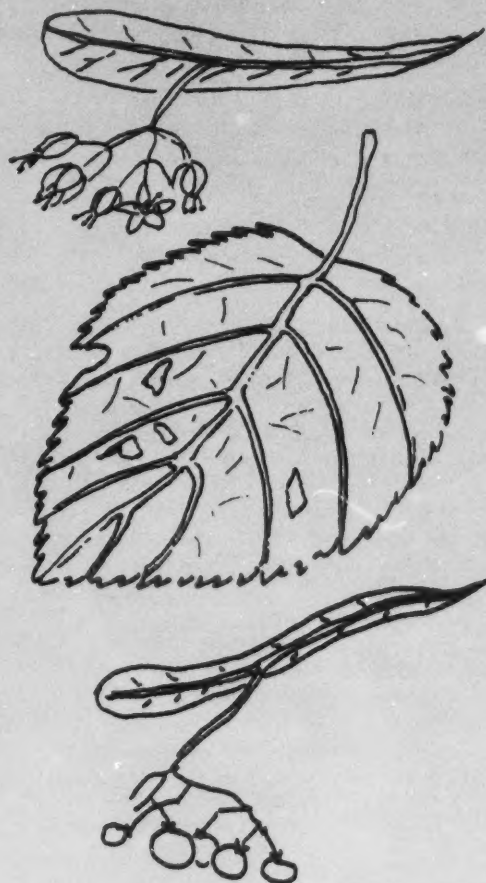
NAME _____

look for these trees

1. shagbark hickory



2. american linden



Post Test #1

I know these trees:

1. Shagbark Hickory ☐

2. American Linden ☐

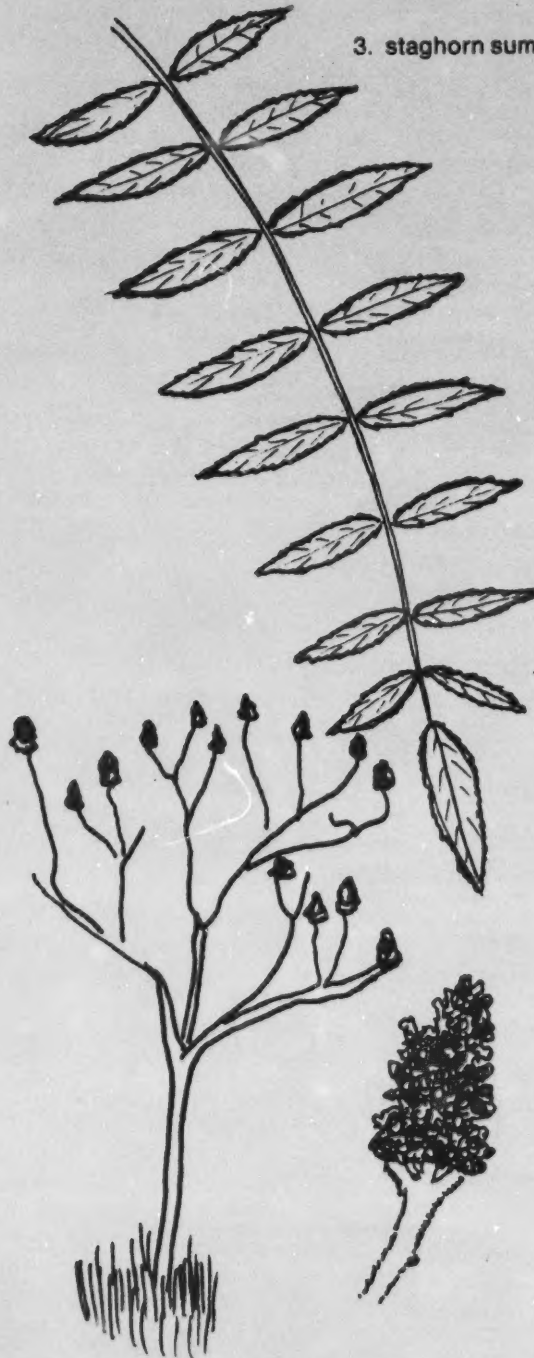


CLASSIFYING Trees

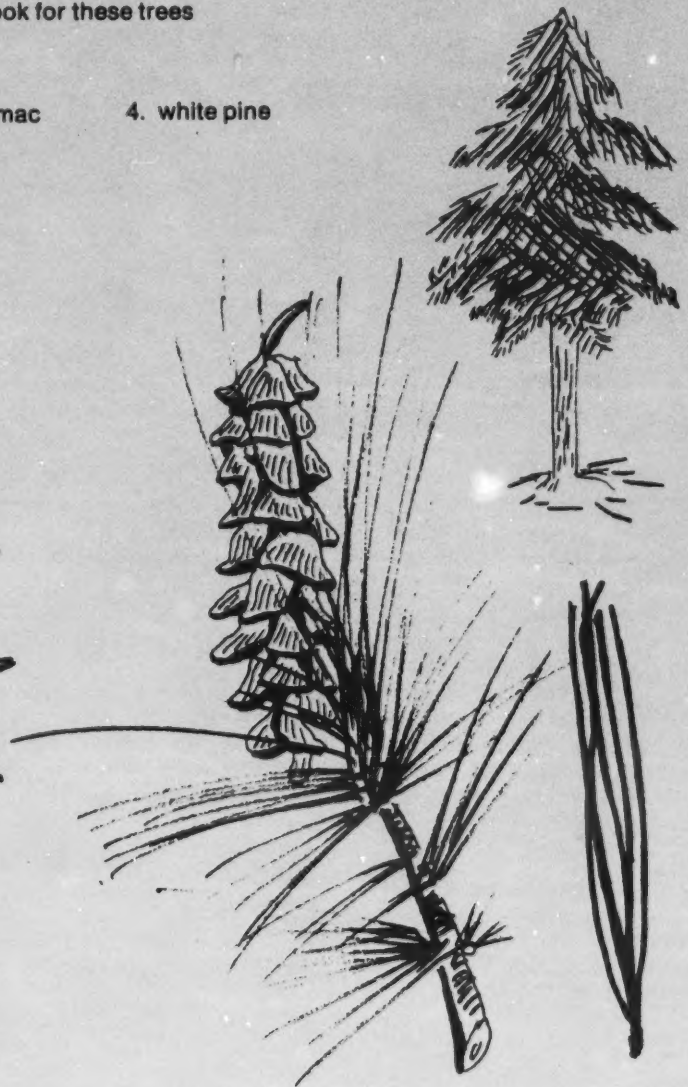
Activity Sheet #1

NAME _____

look for these trees



3. staghorn sumac



4. white pine

Post Test #1

I know these trees

3. Staghorn Sumac ☐

4. White Pine ☐



CLASSIFYING: Observing Living and Non Living Things

Wildflowers

Rationale:

If students identify a few wildflowers each year, they will be acquainted with all the wildflowers on the site by Grade 3.

Instructional Objective:

Given instruction in the O.E.C., each student will recognize the following flowers found on the site: Trillium, Toothworts, Wild Strawberry, and Wild Geranium.

Pretest:

Prior to instruction, hold up pictures of above wildflowers. Ask children if they can identify them.

Vocabulary:

Trillium, Toothworts, Wild Strawberry, Wild Geranium, petals.

Background:

TRILLIUM As their name implies, these flowers are constructed in threes: three leaflets and three petals. The petals range in color from deep-purple red through pink to pure white. The flowers ripen into reddish or purple berries. It belongs to the lily family and blooms about the second week in May.

TOOTHWORTS These slender plants thrive in moist woods. It has a tall smooth stem 6-15 inches high, bear toothed leaves, and a small four petaled flower — white or pinkish in color. The root tastes like watercress. It belongs to the mustard family and blooms in the late spring.

WILD GERANIUM This is a tall slender plant, 20 inches high, with finely cut leaves. The flowers are five petaled: lavender pink and white. It blooms in spring and early summer. It belongs to the geranium family.

WILD STRAWBERRY This is a low growing plant, that grows best in sandy soil. It has a compound leaf with three serrate leaflets. Small white flowers grow and later become a sweet red fruit. These delicious berries are eaten by birds, animals, and boys and girls.

Instructional Procedure:

Before you take students out into the field, show pictures or draw sketches of the above wildflowers. Review the flowers from Kindergarten: Spring Beauties, Marsh Buttercups, Adders-tongues, and Violets.

Activity

- #2. Each student is given a dittoed print of the four wildflowers to help him in identification.

CLASSIFYING Wildflowers

Activity Sheet #2

NAME _____

look for these wildflowers

1. trilliums



2. toothworts



Post Test #2

I know these wildflowers:

1. Trillium

☐

2. Toothworts

☐

33

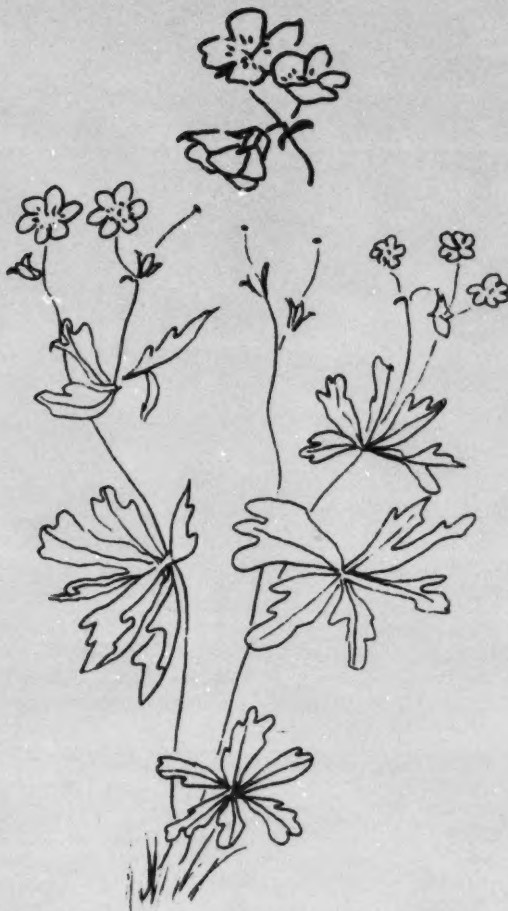
CLASSIFYING Wildflowers

Activity Sheet #2

NAME _____

look for these wildflowers

3. wild geraniums



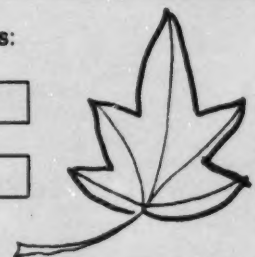
4. wild strawberry



I know these wildflowers:

3. Wild Geraniums ☐

4. Wild Strawberry ☐



CLASSIFYING: Observing Living and Non Living Things

Poison Ivy

Rationale:

It is important that every student be familiar with poison ivy and its harmful effects. The O. E. C. has a bountiful supply of poison ivy; however, areas adjacent to all trails have been sprayed and the poison ivy is now under control.

Instructional Objective:

Each student will recognize and point out poison ivy.

Pretest:

Show students a picture of poison ivy and ask them if they can identify the plant.

Vocabulary:

Irritate, vine, rash.

Background:

Poison ivy is a shrub or climbing vine that is easily recognized when in leaf. The plant has three shiny leaflets that are approximately four inches long. Poison ivy has a white flower in spring and white or gray berries in summer. Over 60 different kinds of birds eat its fruit and spread its seeds over the countryside.

Contact with plant usually results in itching and other symptoms within three to five days. Wash hands with a good strong soap after touching leaves.

Instructional Procedure:

When you show children a print of poison ivy, mention that they will find other plants with leaves in groups of three. For safety, youngsters should abide by the old saying "Leaflets three, let it be."

Activity:

- #3. Each student is given a dittoed print of poison ivy to help him in identifying the plant when in the field.

CLASSIFYING: Observing Living and Non Living Things

Vines

Rationale:

To help the children realize that some plants grow by climbing or clinging to other plants or object. Such plants are called vines.

Instructional Objective:

Given instruction, the student will be able to recognize and point out Wild Grape and Virginia Creeper.

Pretest:

Not needed.

Vocabulary:

Tendrils, cling, compound

Background:

VIRGINIA CREEPER This is a climbing vine with tendrils and fan-compound leaves. The leaflets have five leaves. It has a blue fruit, which is eaten by birds, mice, chipmunks, and skunks.

WILD GRAPE The grape is a thornless, dark stemmed, green flowered high climbing vine that climbs by means of tendrils. The leaves are toothed, heart-shaped, and often lobed. The wild grape engulfs a forest area and destroys trees by breaking the branches and shutting off light. This can be observed at the O. E. C. The grape vine community offers food and protection for a great number of animals; almost 100 species of song-birds feed on its grapes. Opossums are particularly fond of the fruit.

Activity:

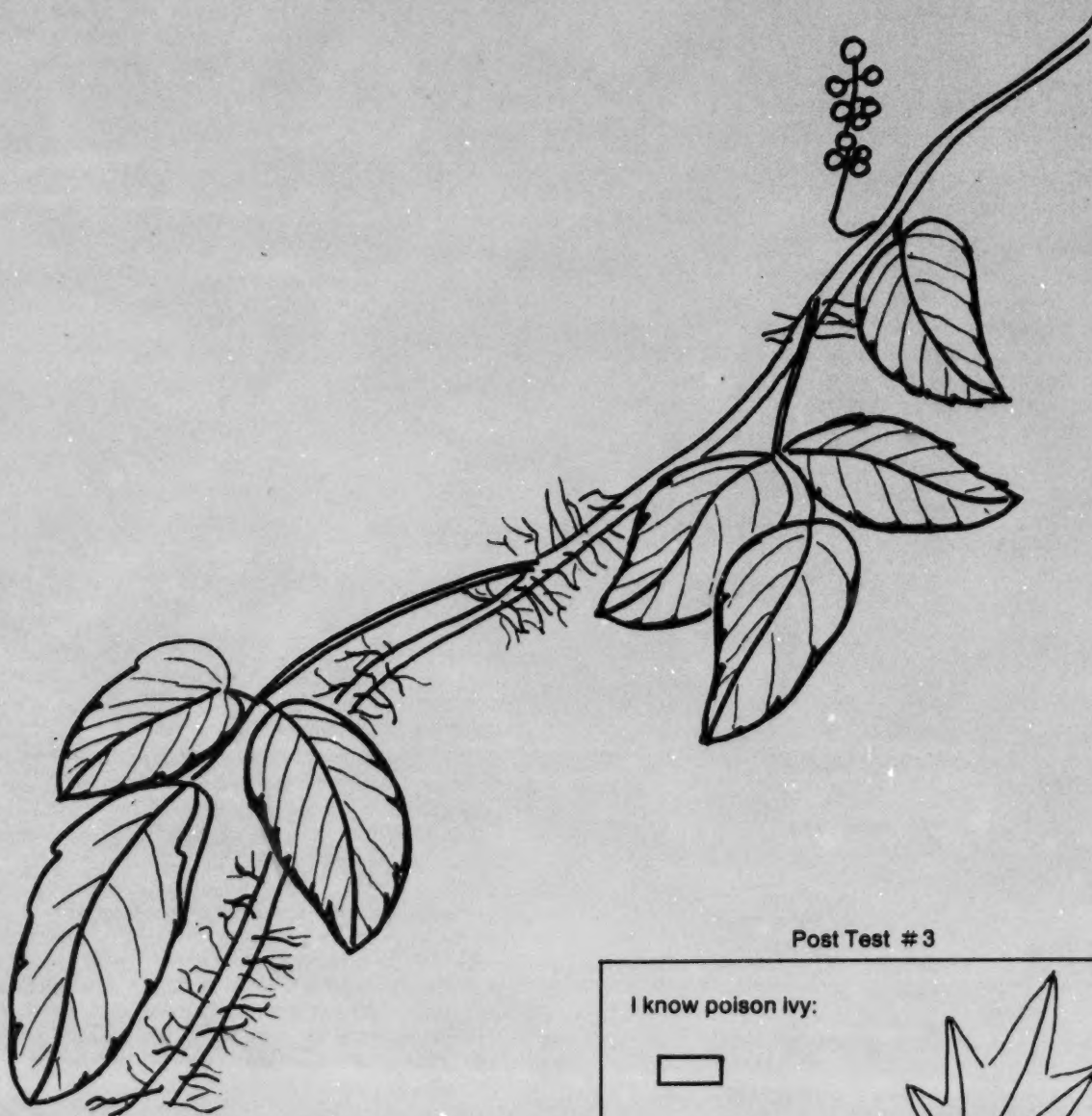
- #4. Give each student a dittoed print of Wild Grape and Virginia Creeper to help him identify these plants.

CLASSIFYING Poison Ivy

Activity Sheet #3

NAME _____

look for poison ivy



Post Test #3

I know poison ivy:



CLASSIFYING Living and Non-Living Things—Vines

Activity Sheet #4

NAME _____

look for these vines

1. virginia creeper



2. wild grape



Post Test #4

I know these vines:

1. Virginia Creeper ☐

2. Wild Grape ☐



CLASSIFYING: Observing Living and Non Living Things

Berries

Rationale:

To help children recognize which plants in the O.E.C. produce the berries they enjoy eating.

Instructional Objective:

Each student will point out a wild raspberry plant.

Pretest:

Not needed.

Vocabulary:

Rambling, prickly, tendrils

Background:

RASPBERRIES Raspberries resemble wild roses. It is a prickly, rambling shrub that climbs over neighboring plants. Its fruit is delicious, and is eaten by birds, animals and little boys and girls. The fruit is ripe early in July.

Activity:

#5. Give each student a dittoed print to help him in identifying the plant.

CLASSIFYING: Observing Living and Non Living Things

Birds

Rationale:

Children should be aware of the importance of birds to our ecology. They should have an opportunity of experiencing the joy of listening and observing birds in a natural setting.

Instructional Objective:

Given instruction at the O. E. C., the student will recognize these four birds: Red-Headed Woodpecker, Mourning Dove, Grackle, and Redwinged Blackbird. All to be found on the site.

Pretest:

Prior to instruction, hold up pictures of the above birds. Ask children if they can identify them.

Vocabulary:

Beak, wing, marsh

Background:

REDWINGED BLACKBIRD No other bird looks like the male with its red shoulder patches. The female is brown with no shoulder patch. This bird lives in marshes and nests in cattails and reeds. It is 9-10 inches in length.

GRACKLE These are large blackbirds with long, wedge shaped tails. They are easily identified by their beautiful iridescent feathers. The female is duller and smaller.

MOURNING DOVE The dove is slimmer than the pigeon and has a long pointed tail. It is found in all 50 states. It is named for its sad call: "Coo-uh, coo." Doves are seed and fruit eaters. They are hunted as a game bird in some parts of the United States. The female is duller with a shorter tail. The dove is 11-13 inches long.

RED-HEADED WOODPECKER This bird is easy to recognize for its bright red head and black and white body. You will hear a woodpecker before you see him. Follow your ears, and you will find a woodpecker propped on a dead tree trunk by his stiff tail feather and sharp claws. He may be pecking away loudly. The woodpecker is about nine inches long and lives on insects.

Instructional Procedure:

Before children go out to the site, show them pictures to help acquaint them with the above birds. Review the birds learned from Kindergarten: Robin, Blue Jay, Cardinal, Crow and Pigeon.

If your library has records of bird calls, have students listen to them before they go out to the site.

Activity

#6. Each student is given a dittoed print of the above birds to help them in identification.

CLASSIFYING Living and Non-Living Things—Berries

Activity Sheet #5

NAME _____

look for this raspberry plant



Post Test #5

I know the raspberry plant. ☐



CLASSIFYING Birds

Activity Sheet #6 & #7

NAME _____

look for these birds

1. redwinged blackbird



2. grackle



Post Test #6

Post Test #7

I know these Birds:

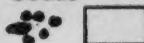
1. Redwinged Blackbird ☐

2. Grackle ☐



They eat:

Seeds


☐

Insects


☐

☐

☐


CLASSIFYING Birds

Activity Sheet #6 & #7

NAME _____

look for these birds

3. mourning dove

4. red-headed woodpecker



Post Test #6

Post Test #7

I know these Birds:

3. Mourning Dove

☐


4. Red-Headed Woodpecker

☐

They eat:

Seeds


☐

Insects


☐

☐

☐


CLASSIFYING

Observing Living and Non-Living Things

Birds' Beaks



Rationale:

Children should learn that "bills" of birds are adapted for getting different kinds of food.

Instructional Objective:

Given instruction on birds of the O.E.C., the student will recognize one bird that eats seeds, and three birds that eat insects.

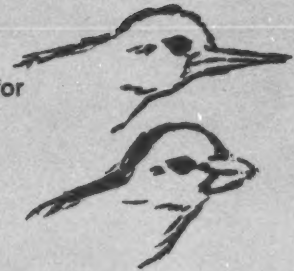
Pretest:

Prior to instruction, show students pictures of birds (Robin, Cardinal, Woodpecker, Mourning Dove). Ask the children what food they think these birds eat.

Background:

Slender, pointed beak for picking up insects.

Short, thick bill for crushing seeds.



Instructional Procedure:

The teacher may want to point out how important birds are in controlling insects. Let children practice drawing bird beaks.

Activity:

#7. Each student will look at Activity Sheet #6 and will decide what each bird eats by the shape of its beak.

CLASSIFYING:

Living and Non Living Things

Living tree — Non Living tree

Rationale:

Children should know the characteristics of living and non living things.

Instructional Objective:

A student will be able to state orally to the teacher or helper, how a live tree differs from a non living tree.

Pretest:

Prior to trip to O.E.C., ask students if they know how a living tree is different from a non living tree.

Instructional Procedure:

Prior to the trip to the O.E.C., have a discussion about living and non living trees. These are some thoughts to bring out:

1. How does the tree change when it dies?
2. What happens to a dead tree?
3. How is a dead tree useful?
4. How does a live tree help us?

Activity #6

- a. At the O. E. C. each student will observe the many living trees and also those few that are not living. Ask the children what they see to be the difference between living and non living trees.
- b. As the children walk along the trail have them identify trees that are living and not living. *

Post test:

Each student will tell in his own words what he has observed as being the difference between a living and a non living tree.

* There is no student activity sheet for this activity.

CLASSIFYING: Living and Non-Living Things

Evergreen trees



Rationale:

Children should be aware that some trees keep their leaves or needles all year. These trees are called *Evergreen* trees. While other trees shed their leaves each year and are called *Deciduous*.

Instructional Objective:

Given instruction on the trees of the O. E. C., each student will be able to identify orally a deciduous tree from an evergreen tree.

Pretest:

Prior to instruction, hold up pictures of a White Pine, a Black Locust, or a Maple tree. Ask the children, if they know whether all these trees keep their leaves in the winter.

Vocabulary:

Evergreen, deciduous

Deciduous trees



Instructional Procedure:

Deciduous is not too difficult a concept for First Graders. Explain it carefully and use it continually so the youngsters become familiar with it.

Activity:

- #7. As each child walks along the path of the O. E. C., he will classify each selected tree as being either evergreen or a deciduous tree.

Post Test:

Along the trail, point out an evergreen tree and a deciduous tree. Child will classify each.

* There are no activity sheets for students with this activity.

USING SPACE/TIME RELATIONSHIPS

Symmetry

Symmetry in Nature

Rationale:

To make children aware that symmetry is present in nature, even though it may not be as perfect as in the commercial world.

Instructional Objective:

The student will discover a minimum of two examples of symmetry in nature by examining trees, leaves, and the fruit of trees.

Pretest:

Show children pictures of the following leaves: Basswood, Elm, Birch, Tulip Poplar, Oak, and Sassafras. Ask children to point to the line of symmetry.

Vocabulary:

symmetry, line of symmetry, symmetrical, not symmetrical

Background:

Symmetry in an object is defined as the repetition — in size, form, and arrangement — of parts on the opposite sides of a plane, line or point. Objects found in our environment may not be exact; however, repetition is close enough that we can say certain plants and animals are symmetrical.

Instructional Procedure:

Do not teach this lesson until you have taught the lesson on symmetry in your regular S.A.P.A. manual.

Activity:

- #1. As children walk along the path, have them find the line of symmetry in such leaves as: Basswood, Maple, Oak, Tulip Poplar, and Sassafras.
- #2. Collect a few pine cones, acorns and other "fruits". Have the students determine if they are symmetrical.
- #3. Find the tree in the shape of a backward 4. (Tree #51 at O.E.C.) Ask the students if this tree is an example of symmetry. *

Follow up activities:

- #4. In the classroom, pass out leaves that have been previously collected and have children examine them for symmetry.
- #5. While in the field have students collect a sampling of leaves that can be pressed for use with the following activities:
 - a. Crayon rubbings
 - b. Splatter prints using paint and tooth brush.
 - c. Collages

Post test:

Ask student to state which leaf has symmetry: an elm leaf or a tulip poplar.

* There is no activity sheet for this activity.

CLASSIFYING: Living and Non Living Things

Animals

Rationale:

To give the students background on one of the animals that lives in the O. E. C. — the *chipmunk*.

Instructional Objective:

The student will be able to describe and list three facts about this animal's living habits.

Pretest:

Ask the students to describe and tell about the chipmunk.

Vocabulary:

rodent, camouflage

Background:

The chipmunk belongs to the squirrel family and squirrels belong to a larger family called rodents. The chipmunk's short brown fur is marked with a strong black and white pattern. He is well camouflaged to blend in with his normal background of dry leaves. He is a small animal and he is always very busy keeping himself clean. He likes nuts, seeds, berries and buds. The chipmunk burrows his home in the ground. He always digs himself a front door and a back door. When he is scolding someone or something, he makes a loud chirping sound very much like a bird. For this reason we sometimes kiddingly call him the "furry bird".

Instructional Procedure:

As you walk along the trail or sit quietly on one of the benches with your group, you might want to tell the children this story.

How the Chipmunk Got His Stripes

The Cherokee Indians have a legend about how the Chipmunk got his stripes. It happened a long, long time ago, when Man first invented the bow and arrow. The bow made Man a good hunter, but this upset the forest animals. All the animals came together at a big meeting. They decided that they would send a terrible disease to Man to punish him. Only the little Chipmunk refused. The Chipmunk said that he had no quarrel with Man. This made the other animals very angry and they attacked the little Chipmunk. The Chipmunk tried to run away, but not before the brown bear grabbed at him. With his sharp claws the bear scratched the Chipmunk's back. To this day, the Chipmunk still carries these claw marks.

Activity:

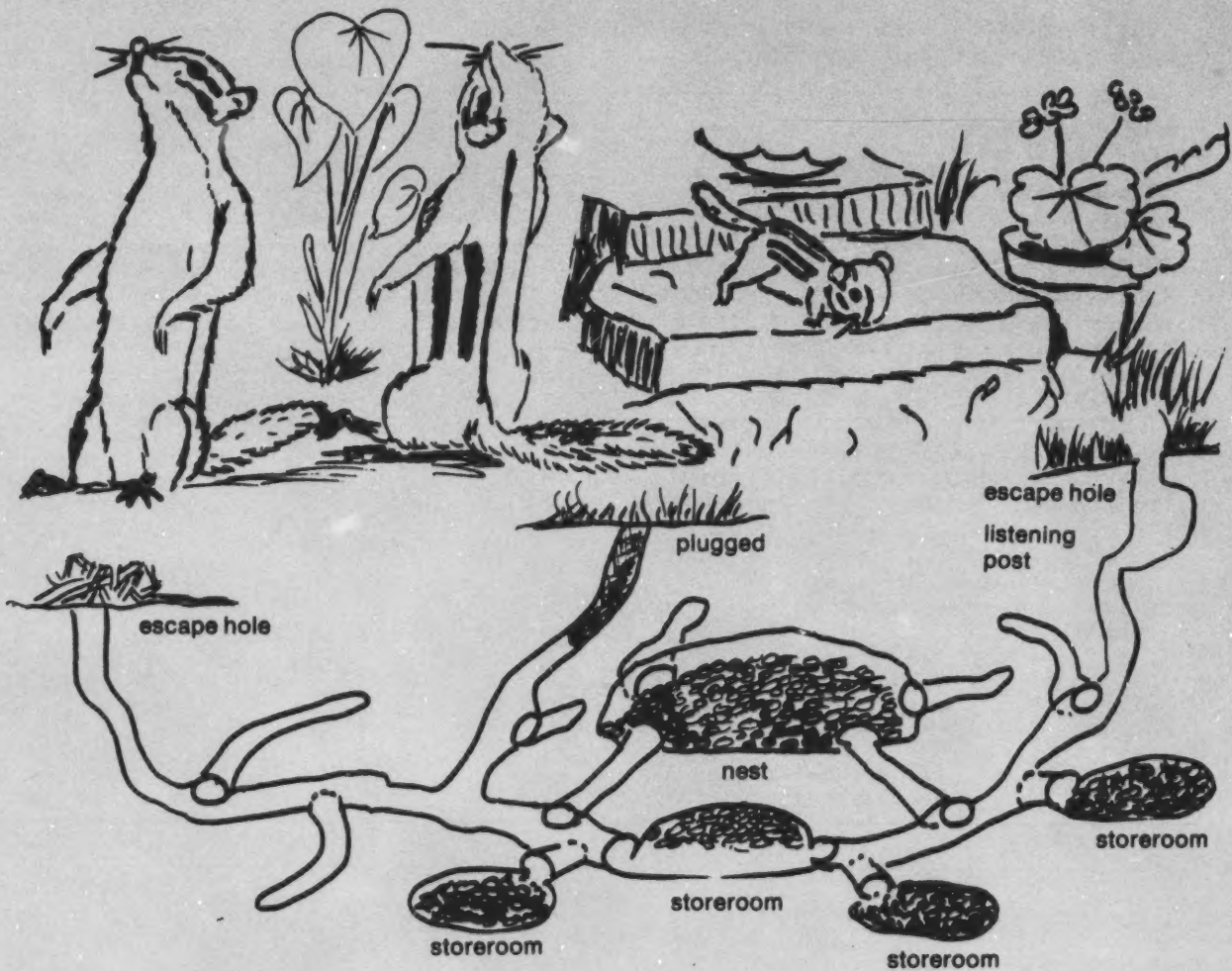
- #8. Have each child look for a chipmunk or his small home. Look for his hole near bushes, stonepiles or woodpiles.

CLASSIFYING Chipmunks

Activity Sheet #10

NAME _____

can you color me?



Post Test # 10

I know a chipmunk.

I can tell three things
about a chipmunk. 1.

2.

3.



OBSERVING:

Using Our Senses in the O. E. C.

Touching

Rationale:

To help children use their senses in discovering the world around them.

Instructional Objective:

By touching selected trees, each student, when blindfolded will be able to orally describe the difference in texture of the barks of four trees.

Pretest:

None.

Vocabulary:

texture, smooth, rough, slippery, bumpy

Instructional Procedure:

Before teaching this lesson, make sure you have taught the one in your S.A.P.A. manual on senses.

Activity:

- #1. Blindfold each child and let him feel the bark of a Shagbark hickory, a beech, a birch, and an elm tree. Have him tell:
 - a. How does it feel? smooth, bumpy, slippery, or rough. Take the blindfold off and have him add to his description.
 - a. What color is the bark, etc.?
- #2. With a sheet of newsprint and pencil make a rubbing of the different barks of trees to take back to the room for sharing. *

Post test:

Have the child orally describe how each tree felt. The instructor should ask the following questions:

1. How did the shagbark hickory feel? _____
2. How did the beech feel? _____
3. How did the birch feel? _____
4. How did the elm feel? _____

* There is no activity sheet for this activity.

OBSERVING:

Using Our Senses in the O.E.C.

Touching

Rationale:

To help children use their senses in discovering the world around them.

Instructional Objective:

By touching the edges of several leaves; (oak, basswood, beech and tulip poplar) the child will learn that leaves differ.

Pretest:

Not needed.

Vocabulary:

jagged, smooth, saw-toothed, pointed

Instructional Procedure:

Before teaching this lesson, make sure you have taught the one in your S.A.P.A. manual on senses.

Activity:

- #1. Let the children feel the edges of these leaves: oak, basswood or American Linden, beech and tulip poplar. Have the student describe how the edge of each leaf felt — rough, smooth, jagged, saw-toothed? *

Post test:

Have student state orally how the elm felt. How the beech felt or how the oak felt.

* There is no activity sheet for this activity.

OBSERVING:

Using Our Senses In the O. E. C.

Smelling

Rationale:

To help children use their senses in discovering the world around them.

Instructional Objective:

By smelling blossoms and twigs, children will be more aware of the outdoor smells.

Pretest:

Not needed.

Vocabulary:

odor, fragrance, pleasant

Instructional Procedure:

Before teaching this lesson, make sure you have taught the one in your S.A.P.A. manual on senses.

Activity:

- # 1. Break a sassafras twig and let the children smell it. Ask students to describe the fragrance.
- # 2. In May, look for a black locust tree. Ask students to describe how the blossoms smell.
- # 3. In the spring, look for blossoms of flowers, shrubs and trees. Ask children to describe their fragrance.
- # 4. Stop along the path, and ask children what they smell. Is it a pleasant smell? Does the ground have an odor? Do leaves smell?
- # 5. Sit quietly on one of the benches and wait. Perhaps the children will see a squirrel, a chipmunk, or some birds.
 - a. What do these birds do when they smell Man or another invader? *

Post test:

Not needed.

* There is no activity sheet for this activity.

OBSERVING:

Using Our Senses In the O. E. C.

Tasting

Rationale:

To help children use their senses in discovering the world around them.

Instructional Objective:

By tasting selected fruits, berries, and grasses, the student will become more aware of his environment.

Pretest:

Not needed.

Vocabulary:

sweet, sour, tart, minty

Background:

It is *important* that we emphasize that children are not to taste all berries, fruits and grasses. Some are dangerous to man.

Activity:

- # 1. Have each student chew on some sour-grass. Ask him to describe the taste.
- # 2. In September, let the children taste black-berries. Ask them to describe the taste.
- # 3. In September have the children taste some mint. Ask them to describe the taste.
- # 4. Let the children taste a berry from the stag-horn sumac tree. Ask them to describe the taste.
- # 5. In June have the children taste wild strawberries. Ask them to describe the taste. *

Post test:

Not needed.

* There is no activity sheet for this activity.

USING NUMBERS:

Numbers 0-99

Rationale:

Children must realize that numbers are found in Nature; also that numbers are necessary and important in our everyday world.

Instructional Objective:

The student will be able to recognize number sequence, and count to 130.

Pretest:

Have students take turns writing their numbers from 1-130 on the chalkboard. (One child can count 1-10, another 11-20, etc.)

Vocabulary:

bundles, needles, leaflets

Background:

Students should have had some background in number sequence and be aware of what the number symbols stand for. The lesson *Numbers 0 through 99* in the S.A.P.A. Science Manual B is excellent preparation.

Activity:

- # 1. As the children walk down the trail, ask them if they see any numbers?
 - a. The students should notice that the trees are numbered.
 - b. Have them call out the numbers as you move along the path. If you skip a number go back and look for the tree you missed.
 - c. Ask the students why they think the trees are numbered?
- # 2. When you come to a Black Locust tree, (which is number 41, 86, 87, 91, 95, or 111) have the student count the leaflets.
 - a. First count by ones.
 - b. Ask if anyone can count by two's.
- # 3. Help children find a White Pine tree. See the map on the next page.
 - a. This is a bundle.
 - b. Ask the students to count the needles in a bundle.
- # 4. When the students come to a sassafras tree (which is 67 or 113) have them see how many different leaf patterns they can find on the tree. This is a review exercise from Level K.

Post test:

Not needed.

MEASURING:

Linear Measurement

Rationale:

To give the students additional experience in measuring and using a centimeter rule.

Instructional Objective:

The children will be able to measure objects of nature using a centimeter rule. Clear plastic centimeter rules are included with the First Grade S.A.P.A. materials.

Pretest:

Not needed.

Vocabulary:

centimeter

Background:

The lesson on Linear Measurement in the S.A.P.A. Science Manual B is excellent preparation for this exercise.

Activity:

- # 1. Have the students measure:
 - a. The length of white pine needles.
 - b. The length of a black locust leaf.
 - c. The length of a black locust seed pod.
 - d. Other items that children choose to measure.*

Post test:

Not necessary.

* There is no student activity sheet for the activity.

USING NUMBERS

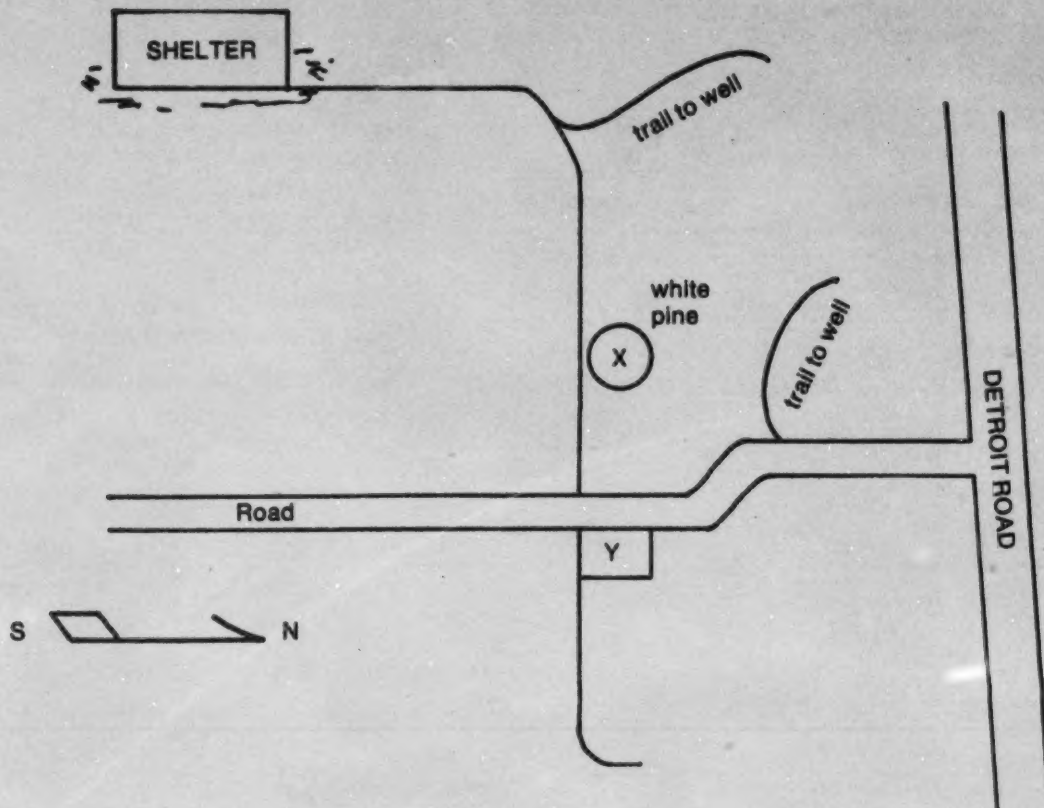
Numbers 0-99

Activity Sheet #3

NAME _____

A map to help you find a White Pine tree in the O. E. C.

CAN YOU FIND IT??



Y—Where Rest Room was burned.

Post Test #3

I found the White Pine tree.

ECOLOGY LEVEL 2

51

A Note to ALL Helping with Ecology Level 2

The following pages are filled with background materials, ideas, and activity sheets for the Level 2 teacher to correlate with her S.A.P.A. Science Manual C. The activity sheets have been so designed to provide ample room for the children to color them. Encourage the children to do this, for it is another way to make students aware of the colors in nature and help them to become more astute in their observations.

If at any time the teacher feels the student knows the subject matter, move him on to the next activity or on to the next grade level. Some activities have post tests. When the student successfully completes the activity, the teacher or accompanying adult will put a "Smile" on the face of the Ant. This ant will be found on all Level 2 activity sheets.

CLASSIFYING:

Trees and Leaves

Rationale:

To increase Level 2 students knowledge of the trees of the O.E.C.

Instructional Objective:

Given instruction at the O.E.C., the student will recognize these trees: cucumber tree, American elm, gray birch American beech and scotch pine.

Pretest:

Prior to instruction, hold up pictures of the above trees to see if students can identify them. If students are familiar with these trees, move on to the next activity or on to the list of trees for Level 3.

Vocabulary:

catkins

Background:

CUCUMBER TREE This is a member of the magnolia family and grows tall to over 100 feet. It gets its name from the fact that its lumpy fruit in the green stage looks something like a cucumber. It is a fine shade tree.

AMERICAN ELM This tree grows to be very large and it spreads its branches like a big umbrella. It makes an excellent shade tree, but a disease called the Dutch elm disease is slowly killing off these wonderful trees. The elm leaf is lopsided; one side is longer than the other. It has a saw-toothed edge; and turns brown and yellow in the fall. The elm has a small brownish flower that blooms in early spring, and flat round winged seeds.

GRAY BIRCH This tree grows in sunny places and is easy to identify by its white bark. In spring

many long yellow catkins dangle from the birch, shaking their pollen on the wind. The gray birch has a triangle shaped leaf with a rough saw-toothed edge. The fruit which looks like a cone is a stack of flat oval seeds that fall apart in winter.

AMERICAN BEECH This is a tall spreading tree of the shady forest and has a smooth gray bark. It has a small simple leaf with neat straight veins. At the end of each vein is a tooth. The leaves turn brown in the fall. The big roots of a beech tree spread out flat along the ground and often have moss or ferns growing around them. Beech nuts are small and have prickly husks that crack open. These nuts are eaten by small animals and birds.

SCOTCH PINE This is a common evergreen and many are found in our Metropolitan parks. The leaves are in bundles of two and about five centimeters in length. The cones are re-curved toward the trunk of the tree. The bark of the tree near the top branches resembles a scotch plaid. Much of the bark is light orange in color.

Instructional Procedure:

Before students go out into the field, show them pictures of the above trees. Also review trees from Level K and Level L: sassafras, tulip poplar, oak, maple, willow, shagbark hickory, American linden, black locust, staghorn sumac, and white pine.

Activity:

#1. Each student is given a dittoed print of the trees to be identified. While in the field, he will compare the drawing to the actual tree found along the hiking trail at the O.E.C.

CLASSIFYING Trees and Leaves

Activity Sheet #1

NAME _____

1. cucumber tree



2. gray birch



Post test #1

I know these trees.

1. cucumber tree

☐

2. gray birch

☐

CLASSIFYING Trees and leaves

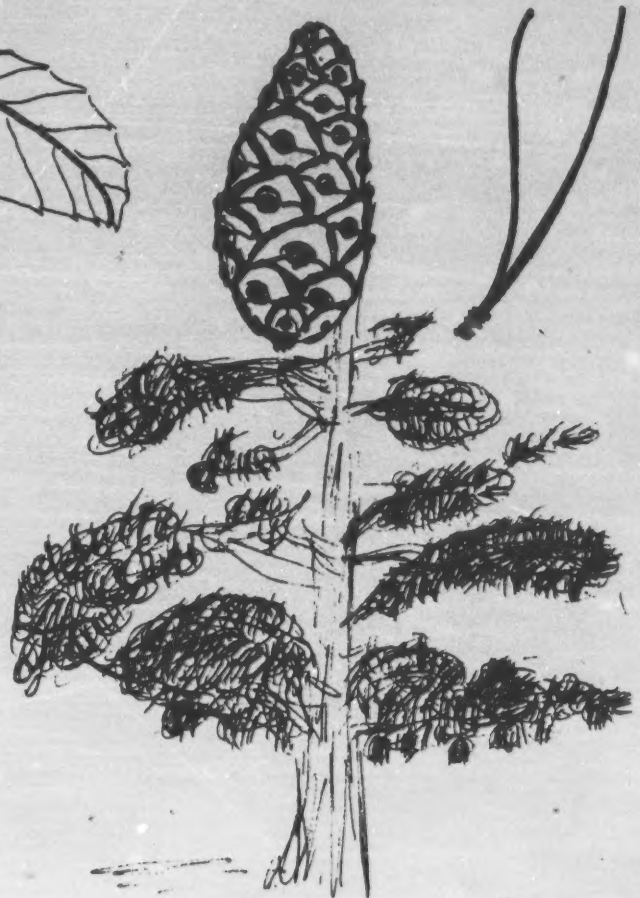
Activity Sheet #1

NAME _____

3. American beech



4. scotch pine



Post test #1

I know these trees.

3. American beech

☐

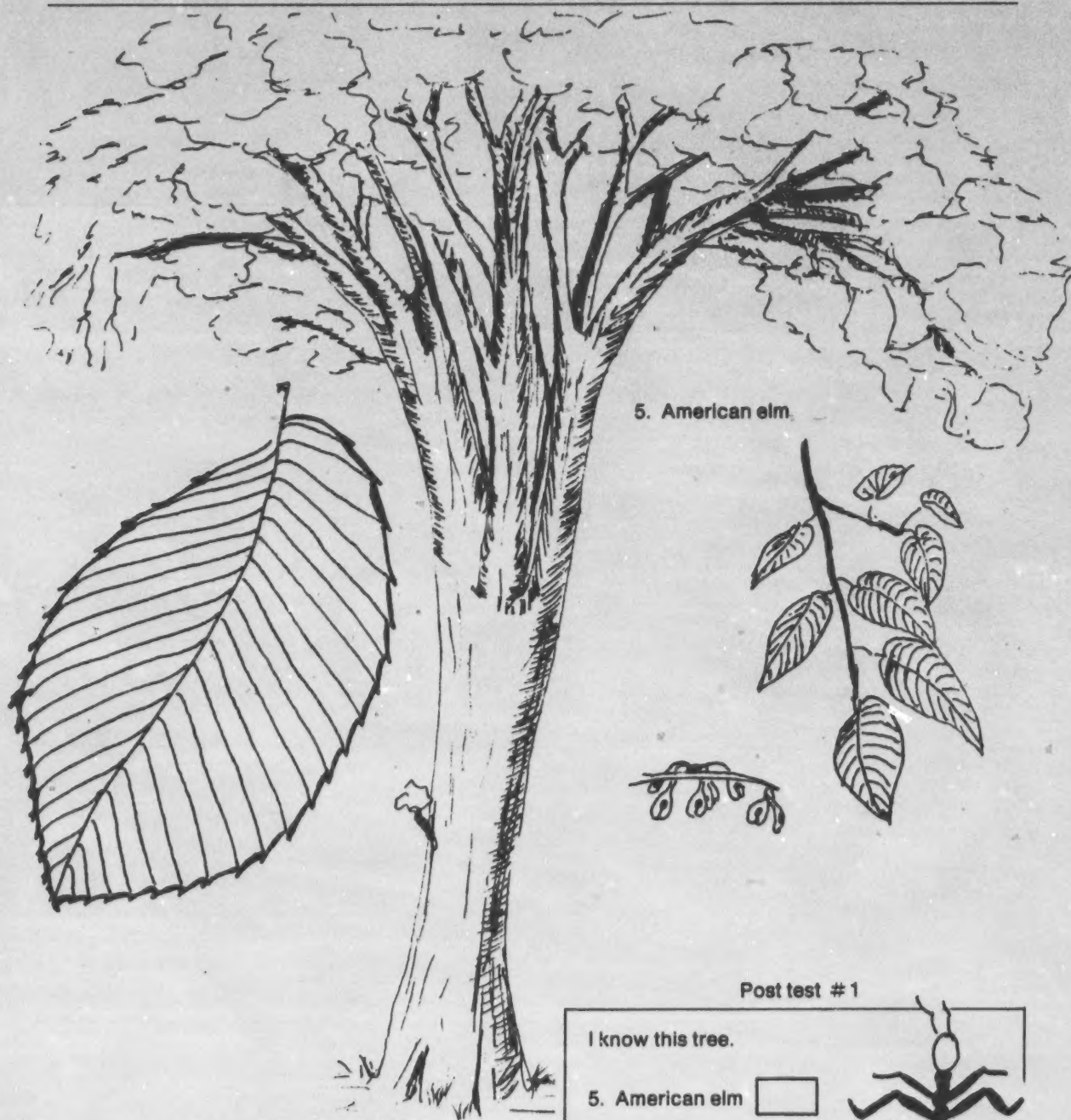
4. scotch pine

☐

CLASSIFYING Trees and leaves

Activity Sheet #1

NAME _____



Post test #1

I know this tree.

5. American elm

☐

CLASSIFYING: Parts of the Leaf

Rationale:

It is time that the student take a more critical look at a leaf and begin to learn the proper terminology in discussing leaves.

Instructional Objective:

Given instruction the student will be able to recognize a leaf with lobes and one without lobes.

Pretest:

Not needed.

Vocabulary:

lobe

Background:

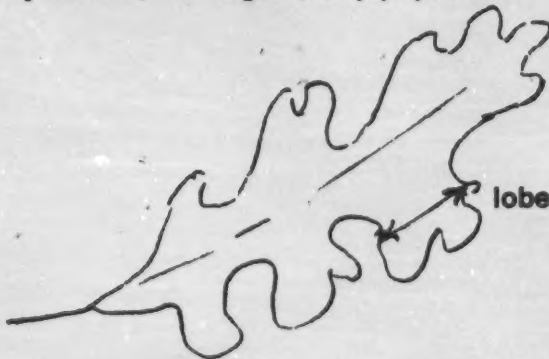
LEAVES WITHOUT LOBES: ELM, beech, willow, black locust, birch, shagbark hickory, basswood

Activity:

- #2. The student will receive a dittoed print of a variety of leaves. The student will circle all leaves with lobes.
- a. After the students have completed the activity, name the leaves present on the ditto.
- b. This activity can be done in the field or in the classroom.



Leaves with lobes: maple, oak, sycamore, sweet gum, tulip poplar

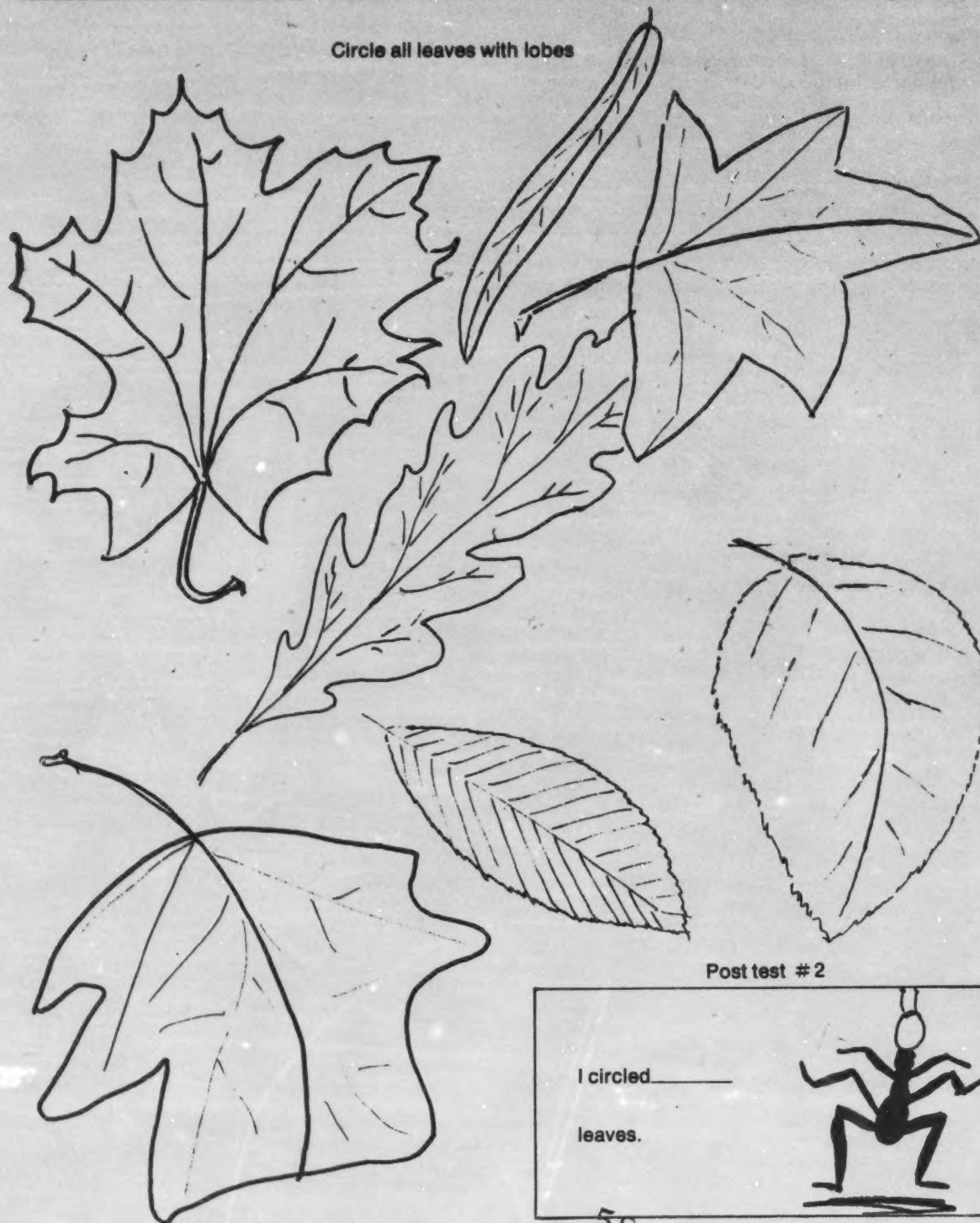


CLASSIFYING Parts of the leaf

Activity Sheet #2

NAME _____

Circle all leaves with lobes



Post test #2

I circled _____

leaves.



58

CLASSIFYING: Wildflowers

Rationale:

It is our hope that Rocky River students will develop a knowledge of and an appreciation for wildflowers.

Instructional Objective:

Given instruction the student will recognize these wildflowers: mayapple, Jack-in-the-pulpit, false Solomon's seal, Queen Anne's lace, and gold-enrod.

Pretest:

Prior to instruction, hold up pictures of the above flowers. If the student is familiar with these flowers go on to the next activity.

Vocabulary:

poisonous, spadix, edible, extinct

Background:

MAYAPPLE This flower is found in great abundance at the O.E.C. It has large umbrella-like leaves. It has a white flower and blooms in late spring. It is a member of the barberry family. The edible lemon-yellow fruit has a strawberry flavor, but the root, stem and leaves are *Poisonous*.

JACK-IN-THE-PULPIT This is an American wildflower that grows in moist woodlands and thickets. The loss of wooded areas in Rocky River has resulted in a scarcity of this attractive flower. This flower has been well named. The part that looks like the preacher is the slender stalk called the spadix. The tiny greenish-yellow flowers grow in a club-shaped spike on the upper part of this stalk. The "Pulpit" is a leaflike growth which encloses the spadix like a trumpet. The oddly shaped flowers bloom from April to June, and then produce clusters of smooth, red berries. The plant grows from a turniplike root filled with starchy juice. The juice sometimes used in home-made cough medicine, has a stinging, bitter taste. The root is tasteless when boiled, but it is a nourishing food. It is also called Indian turnip.

FALSE SOLOMON-SEAL The small starry white flowers of this plant form a cluster at the end of the stem. The flowers ripen into small red or bronze berries. It blooms in the late spring and early summer; and belongs to the lily family.

QUEEN-ANNE'S LACE This flower is also called wild carrot, for its leaf resembles that of a carrot leaf. It is a member of the parsley family. This large white lacy flower is really a cluster of tiny white flowers. It grows in great quantity in Rocky River and in the O.E.C. It blooms in summer and fall. Many people dry it and use it in lovely bouquets.

GOLDENROD This flower is easy to identify for it is the tall yellow flower we see growing along roadsides or in open fields in summer and fall. The tiny flowers are clustered along the stem. Some people are sensitive to its pollen. There are over 125 species of golden rod that grow in this country.

Instructional Procedure:

Prior to field trip, show students pictures of the above wildflowers. Review the flowers from Level K and Level 1: spring beauties, marsh buttercups, adderstongues, violets, trilliums, toothworts, wild geranium, and wild strawberry. Encourage the children not to pick the wildflowers. Many wild plants are now so scarce that if they are picked unwisely there may not be any of them left and they will become extinct.

Activity:

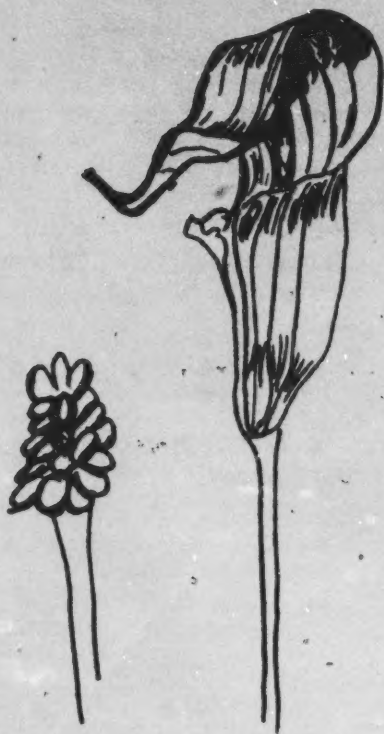
- #3. Each student is given a dittoed print of the five wildflowers to help him in identification.
- #4. Have the children choose a weed they think is beautiful and one that is ugly. Let them discuss the reasons for their choices they have made. This could be done back in the room in a large group discussion. A point to be made: what is beautiful to one may not be beautiful to another, and what is ugly to one may not be ugly to another.
- #5. As you walk along the path observing wildflowers, ask the children "what the flowers look like to you"? Do the dandelions look like soldiers or lions? Does the Jack-in-the-pulpit really look like a preacher? Back in the classroom ask the students to choose a wildflower and write a story or poem about it.

CLASSIFYING Wildflowers

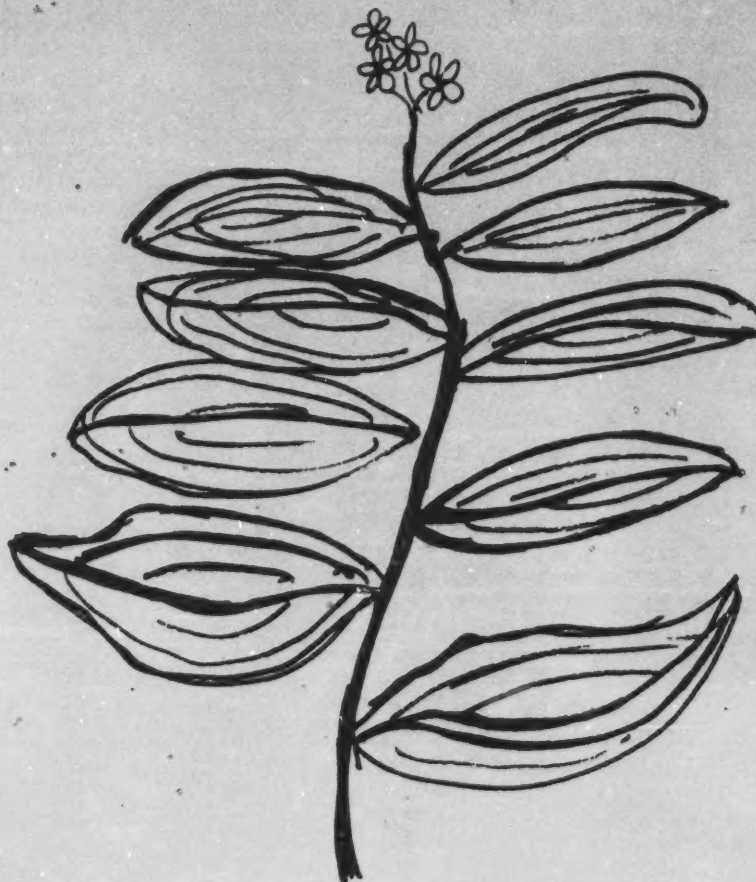
Activity Sheet #3

NAME _____

1. Jack-in-the-pulpit



2. False Solomon-seal



Post test #3

I know these wildflowers.

1. Jack-in-the-pulpit ☐

2. False Solomon-seal ☐



CLASSIFYING Wildflowers

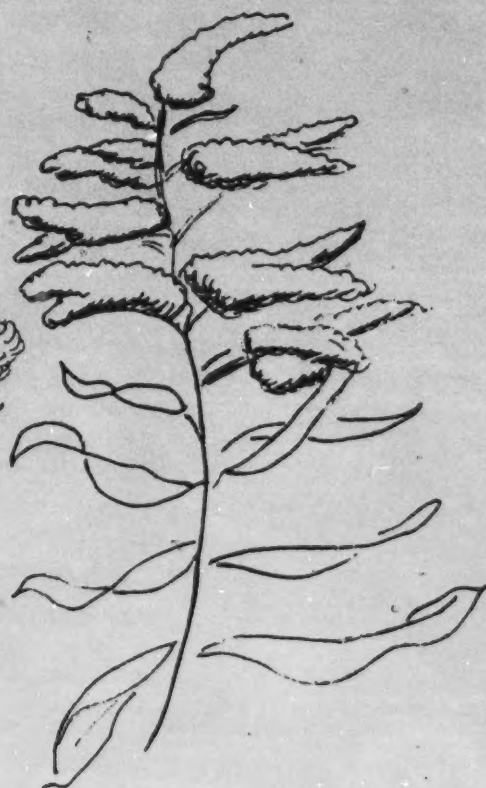
Activity Sheet #3

NAME _____

3. Queen-Anne's lace



4. Goldenrod



Post test #3

I know these wildflowers.

3. Queen-Anne's lace ☐

4. Goldenrod ☐



CLASSIFYING Wildflowers

Activity Sheet #3

NAME _____

5. Mayapple



Post test #3

I know this wildflower.

5. Mayapple

☐

CLASSIFYING:

Vines

Rationale:

To give students additional background in plants that grow along the ground or climb walls by means of tendrils.

Instructional Objective:

Given instruction at the O.E.C., the student will recognize the following vines: greenbrier and honeysuckle.

Pretest:

Prior to instruction show children pictures of greenbrier and honeysuckle and ask them to identify these plants.

Vocabulary:

tendrils, foliage, aerial rootlets

Background:

GREENBRIER This is a green-stemmed vine that climbs by tendrils. It is a woody member of the lily family. The greenbrier is prickly and retains foli-

age all winter. The fruit is small berries which is eaten by birds.

HONEYSUCKLE This vine is easily identified when it is in bloom by its lovely sweet fragrance. It has a pretty white or yellow trumpet-like flower. The honeysuckle climbs by twining stems, not by tendrils or aerial rootlets.

POISON IVY — REVIEW This is a shrub or climbing vine that is easily recognized when in leaf. The plant has three shiny leaflets that are approximately four inches long. Poison ivy has a white flower in spring and white or gray berries in summer. Remind children of the old saying, "Leaflets three, let it be". Wash hands with a good strong soap after touching leaves.

Activity:

#6. Each student is given a dittoed print of the vines greenbrier, honeysuckle, and poison ivy to help him with identification.

CLASSIFYING Vines

Activity Sheet #6

NAME _____

1. greenbrier



2. honeysuckle



Post test #6

I know these vines.

1. greenbrier

☐

2. honeysuckle

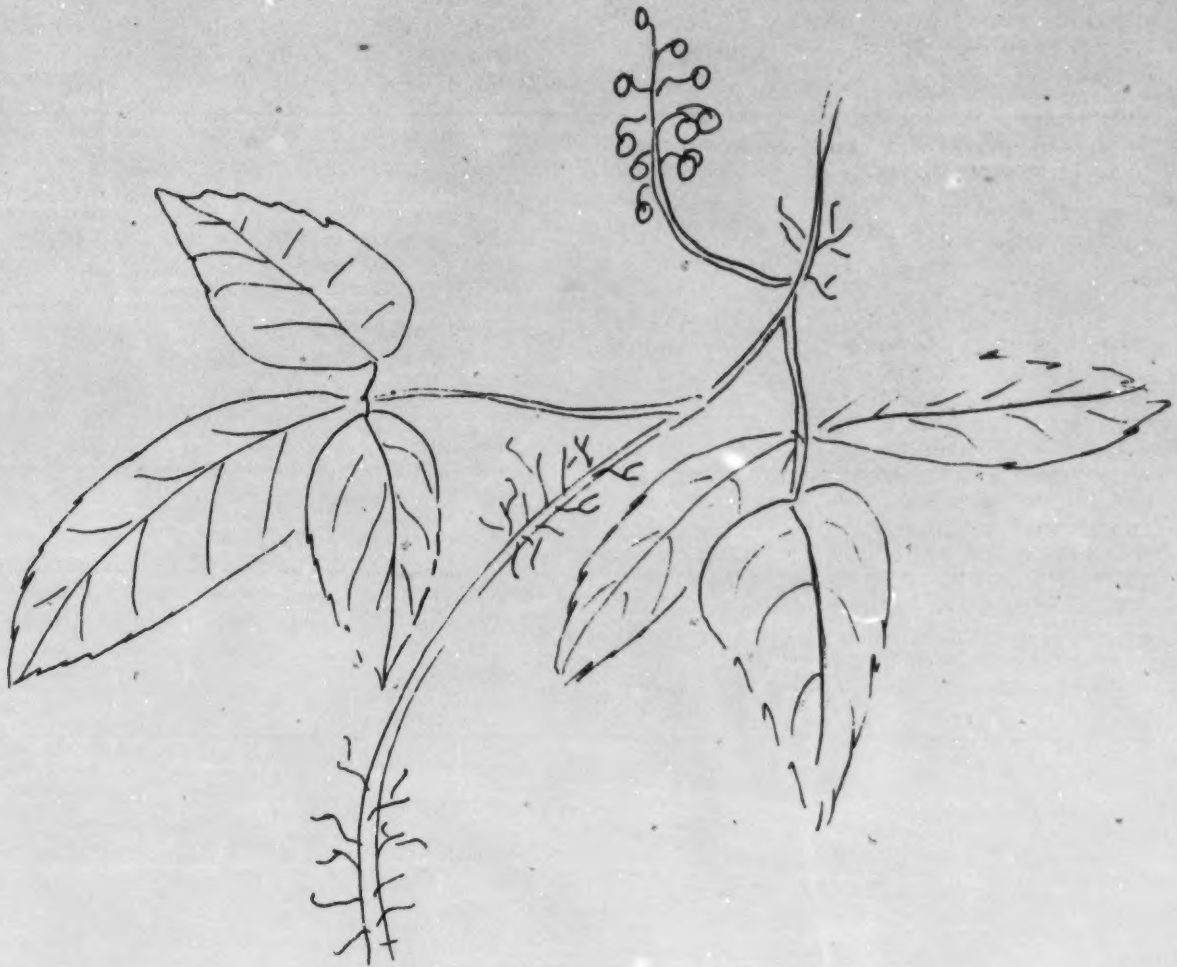
☐

CLASSIFYING Vines

Activity Sheet # 6

NAME _____

3. poison ivy



Post test # 6

I know this vine.

3. poison ivy

☐

CLASSIFYING:

Birds

Rationale:

Children should be aware of the importance of birds to our ecology. They should have an opportunity of experiencing the joy of listening and observing birds in a natural setting.

Instructional Objective:

Given instruction at the O.E.C., the student will recognize these five birds: song sparrow, junco, hairy woodpecker, flicker, and the goldfinch or wild canary.

Pretest:

Prior to instruction hold up pictures of the above birds for students to identify.

Vocabulary:

conical, hedgerows

Background:

SONG SPARROW This bird gets its name for the sweet, melodious song it sings; especially in early spring. Sometimes this little sparrow is called the "band director of the forest" because his call sounds like 1-2-3-play . . . ! The song sparrow lives in shrubs and hedgerows. It is a small brown bird striped with gray and white. It has a white breast with a black spot right in the center which helps to identify it. It has a long rounded tail and a short, conical bill well suited for crushing seeds. It lives here all year around.

JUNCO This bird belongs to the sparrow family and is often seen on the ground eating seeds. The male junco is slate gray with a white breast and white outer tail feathers which can be seen very distinctly when he flies. The female is smaller and browner and resembles a sparrow.

HAIRY WOODPECKER The hairy woodpecker and the downy woodpecker look very much alike except that the hairy woodpecker is two inches larger and has a heavier black bill. The male has a small red head patch, the female does not. The woodpecker is black and white with a white stripe down its back.

FLICKER This bird is often found on the ground hunting for ants. Like all woodpecker, he nests in a cavity of a dead trunk or branch. He is a large, brown bird with a white rump, golden wing linings, and a black breast band.

GOLDFINCH OR WILD CANARY This bird has a small yellow body, black forehead and wings. It is a member of the sparrow family. The goldfinch is a bird of the fields and meadow and feeds and nests near the ground. It has a lovely clear song and like all sparrows is a seed eater.

Instructional Procedure:

Prior to trip to the O.E.C., show students pictures of the above birds and review birds from Level K and Level 1: robin, blue jay, cardinal, pidgeon, crow, red-headed woodpecker mourning dove, grackle, and redwinged blackbird. Listen to records of bird calls if they are available.

Activity:

#7. Each student is given a dittoed print of these birds: song sparrow, junco, hairy woodpecker, flicker, goldfinch to help him in identification.

CLASSIFYING Birds

Activity Sheet #7

NAME _____

1. song sparrow

2. junco



Post test #7

I know these birds.

1. song sparrow ☐

2. junco ☐



CLASSIFYING Birds

Activity Sheet #7

NAME _____

3. flicker



4. goldfinch or wild canary



Post test #7

I know these birds.

3. flicker

☐

4. goldfinch

☐

CLASSIFYING Birds

Activity Sheet #7

NAME _____

5. hairy woodpecker



Post test #7

I know this bird.

5. hairy woodpecker

☐

CLASSIFYING: Identifying Birds by Bills, Tails, and Feet

Rationale:

It is important for the students to realize that a bird's body is adapted to suit his way of life.

Instructional Objective:

Given instruction at the O.E.C., the student will be able to identify birds by their bills, tails, and feet.

Pretest:

Not needed.

Vocabulary:

mandibles, preening

Background:

BILLS Bills of birds are adapted for getting different foods. They serve for nest building, preening feathers, and protection.



1.
A slender, pointed bill for picking up insects: robin, woodpecker



2.
A short, thick bill for crushing seeds: sparrow, cardinal, goldfinch



3.
Short, stout bill for feeding on the ground

TAILS Tails provide balance when perching and flying. They are rudders during flight.



1.
A broad fanned tail is good for soaring: crow, grackle, starling, red-winged blackbird

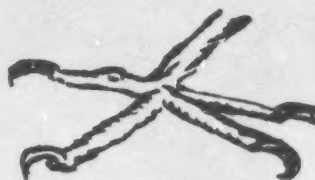


2.
Tail feathers with strong spine-like tips give some birds support when clinging to vertical surfaces: red-headed woodpecker, hairy woodpecker, flicker

FEET Feet are built for perching, scratching, walking, and for seizing prey.



1.
Three toes in front, one behind, clasp the perch when the leg is relaxed: sparrow, robin, blue jay



2.
Two toes in front, two toes in back; sharp claws for clinging to an upright surface: woodpecker, nuthatch

Instructional Procedure:

Prior to trip to O.E.C., show pictures, slides, filmstrips or sketches on the overhead, of birds to be observed at the O.E.C. point out to the children how each bird is particularly adapted to live at the Outdoor Center.

Activity:

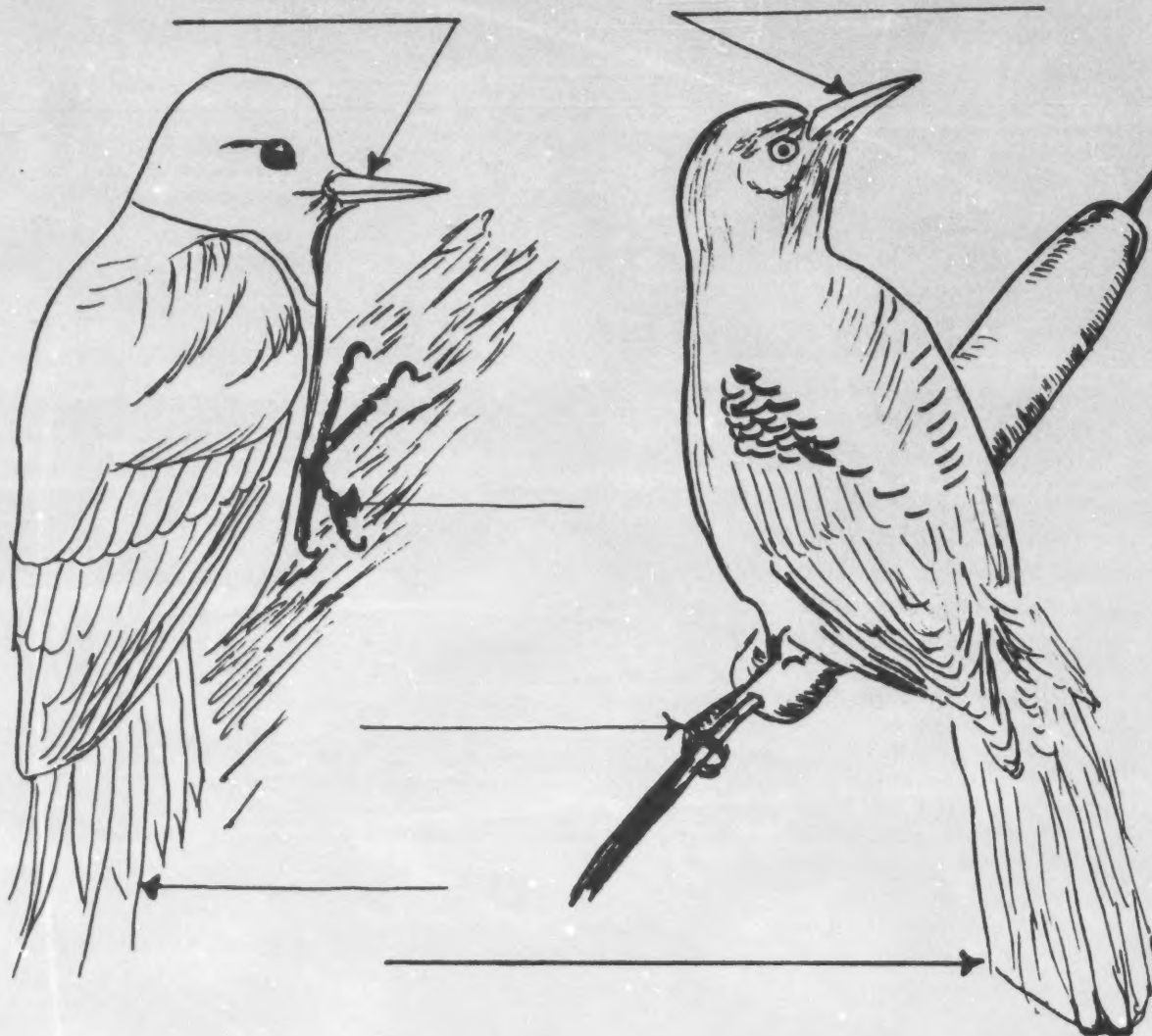
- #8. Each student will be given a dittoed print of several birds, and he will have to tell how that bird is adapted to live at the O.E.C.
- #9. each student will receive a ditto with descriptions of birds found at the O.E.C. The student will identify the bird by the description.

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CLASSIFYING **Identifying birds by bills, tails, and feet**

Activity Sheet #8

NAME _____



Post test #8

I can name the birds:



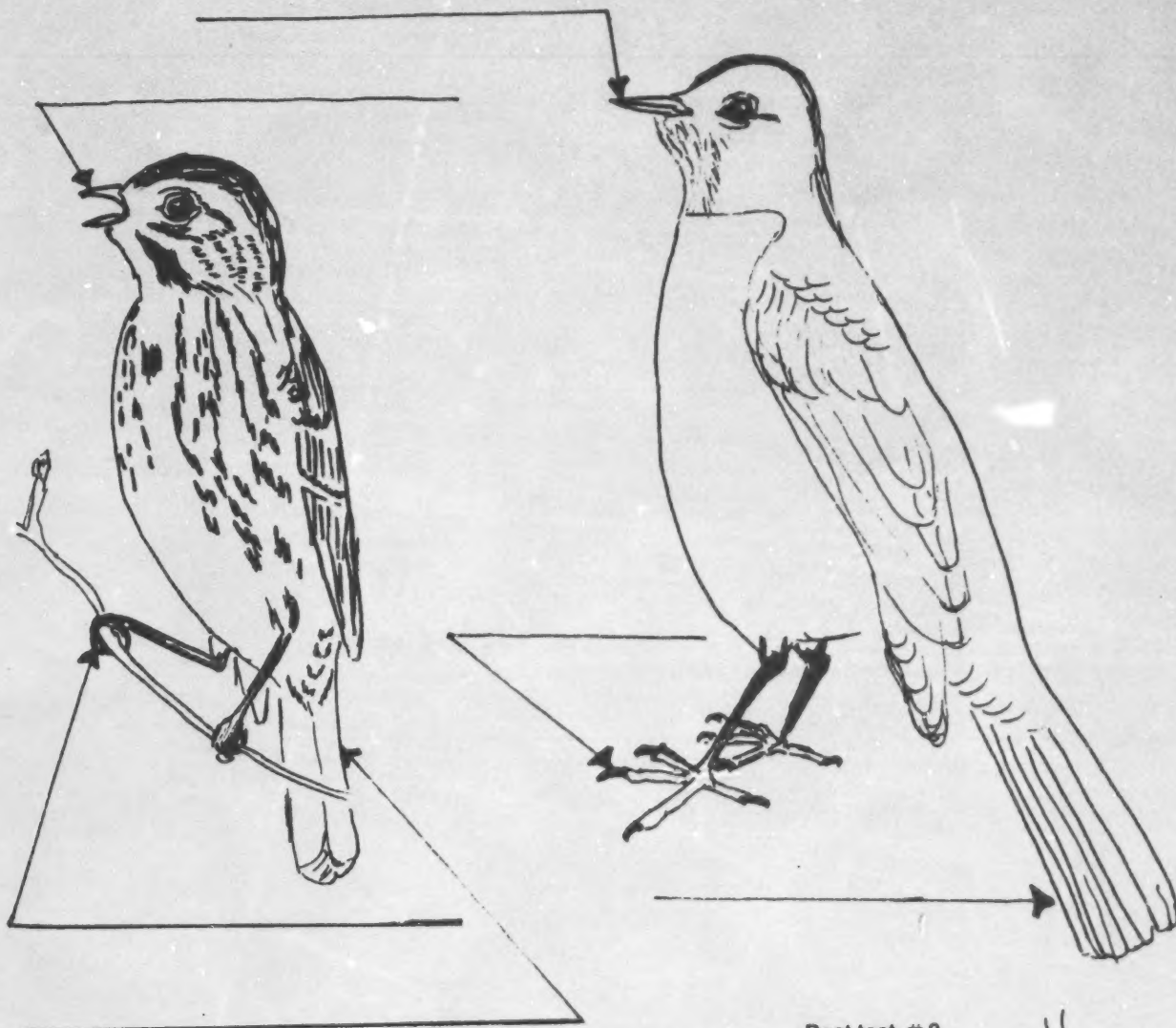
I know how they are adapted to life.

☐

CLASSIFYING Identifying birds by bills, tails, and feet

Activity Sheet #8

NAME _____



Post test #8

I can name the birds:



I know how they are adapted to life. ☐

CLASSIFYING:

Identifying birds by bills, tails, and feet

Activity sheet #9

NAME _____

1. I am a small brown and white bird. I have a short, conelike bill, good for eating seeds. I have a black spot on my breast. I sing a pretty song in spring.

Who am I? _____

2. I can be found perched on the side of a tree pecking for insects. I am black and white with a red patch on my head.

Who am I? _____

3. I look like a sparrow, I am a seed-eater. I am slate gray in color, and I have two white outer tail feathers that can be easily seen when I fly.

Who am I? _____

4. I am a "sign of spring". I eat insects and worms. I have a pretty orange breast.

Who am I? _____

5. I am a small, yellow songbird, with black wings. I live in bushes and eat seeds.

Who am I? _____

6. I am a big, black, noisy bird. My call is caw-caw.

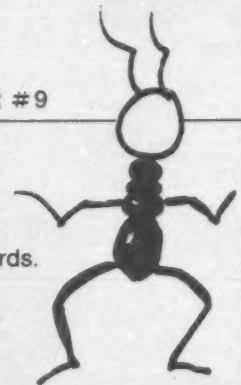
Who am I? _____

7. I have a fancy blue crest on my head. I am a pretty, bright, blue with some white and black too. I have a squawking call. Sometimes other birds do not like me because I chase them away from their dinner.

Who am I? _____

Post test #9

I KNOW _____ birds.



CLASSIFYING:

Animals — The Ground Hog

Rationale:

It is important for students to become acquainted with the animals of the O.E.C.

Instructional Objective:

Given instruction, the student will recognize and be able to write five facts about the ground hog.

Pretest:

Prior to instruction, hold up a picture of a ground hog and ask the children to identify it.

Vocabulary:

hibernate, rodent

Background: Read to Students

GROUND HOG He is also known as the woodchuck. The ground hog is a brown, furry animal, who is born early in spring in a burrow under the ground. When he is born, he is very tiny and has no hair, but his mother has a warm nest of grass for him. Usually he has three or four brothers and sisters. His mother nurses him just the way a mother cat nurses her kittens.

As soon as his eyes are open, he can go outside and find his own greens. When he is big enough he will dig his own burrow. While the ground hog digs his new home, he must also get ready for winter. He eats grasses, seeds, roots, leaves, fruit and sometimes grasshoppers and June bugs. There is no food for him in winter so he eats all summer. By early fall he will be so fat he can hardly hold his stomach off the ground.

When it grows colder, the ground hog will close himself up in his bedroom. His heart will beat slower, his body will become cool, his breathing will be slower and he will go into a deep sleep. He uses his stored food fat for food and he will sleep until March. This winter sleep is called hibernation.

When a ground hog is two years old, he will be a mother or a father. When he is six, he will be old and gray. His claws are heavy and his muscles strong. His sharp rodent's teeth grow all his life and he is a good fighter if cornered.

Instructional Procedure:

Read the above story to the class and show them pictures of a ground hog. Discuss Ground Hog day — February 2nd. Point out to the children that the ground hog really comes out of his burrow to sniff the air and see if spring is here.

Activity:

- # 10. Give each student a dittoed print of a ground hog to help him in identification. Have him turn paper over and write five facts about the ground hog.
 - a. The student can write the facts back in the classroom.

CLASSIFYING
Animals—the ground hog

Activity Sheet #10

NAME _____

ground hog



Post test #10

I know the ground hog. ☐

I know five facts about
the ground hog. ☐



OBSERVING:

Shapes in Nature — Natural and Man-made

Rationale:

It is important for students to see that shapes are ever present in nature.

Instructional Objective:

Given instruction in the O.E.C., the student will recognize these shapes in nature: triangle, heart-shaped, spiral, star-shaped, elliptical, kidney-shaped, circle, rectangle, square, and cylindrical.

Pretest:

Prior to instruction, hold up pictures of the above geometrical shapes to see if students can identify them.

Vocabulary:

spiral, elliptical, cylindrical, cone, sphere, kidney-shaped

Background:



Triangle Shape



a. birch leaf



b. catalpa leaf



c. eastern cottonwood leaf



d. shape of an evergreen tree



Heart-shape



a. basswood or American linden leaf



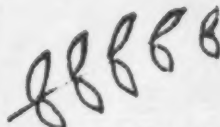
b. wild grape leaf



c. violet leaf



Elliptical



a. black locust leaflet



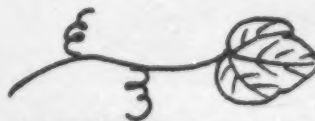
b. American beech leaf



c. cucumber leaf



Spiral



a. tendrils of Z grape vine



Star Shape

a. sweet gum leaf





Kidney-shape



a. seeds of black locust



Circle



a. acorn top and other seeds



b. sawed tree trunks



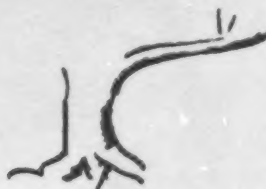
c. growth rings in a tree trunk



d. cans, bottles, barrels



Cylinders



a. tree trunks, twigs



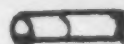
b. plant stems



c. cans



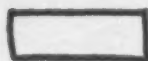
d. clay tile



e. cigarette butts



f. acorns



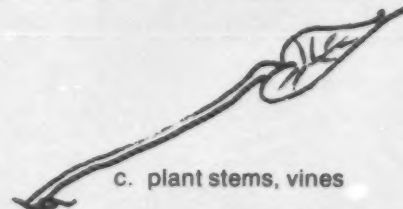
Rectangles



a. tree trunks, twigs



b. trail markers



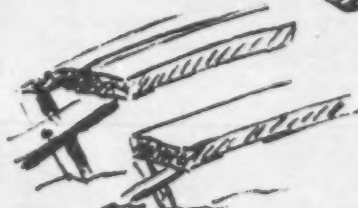
c. plant stems, vines



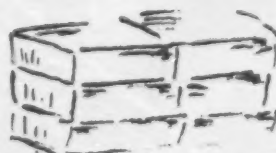
d. matchbox covers



e. cigarette packs



f. picnic tables and benches



g. bricks



Square



a. mint stems



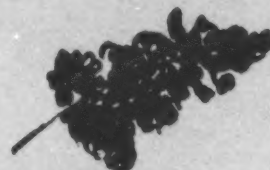
Spheres



a. seeds of deadly
nightshade



b. cherry seeds



c. sumac berries



Cone



a. pine cone



b. bird bills — sparrow

Instructional Procedure:

Prior to your trip, discuss the shapes that children think that they might find at the O.E.C.

Activity:

- # 1. Tell students they are going on a scavenger hunt and let them choose partners. Give them a list of shapes and tell them they must have an example for each-natural or man-made. Give them a 10 minute time limit and spread out in different directions to look. Come together and discuss findings.
- # 2. Each student will receive a ditto with drawings representing different shapes in nature — natural and man-made. The student must label the drawing as to the appropriate shape.
 - a. The student can do this activity back in the classroom.

OBSERVING

Shapes in Nature—natural and man-made

Activity Sheet #1

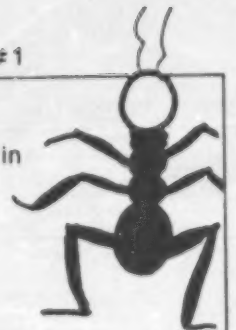
NAME _____

1. triangle
2. heart-shape
3. elliptical
4. spiral
5. star shape
6. kidney-shape

7. circle
8. cylinder
9. rectangle
10. square
11. sphere

Post test #1

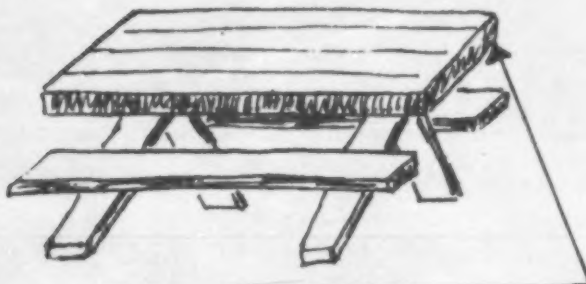
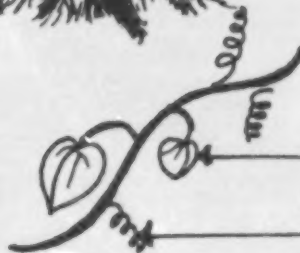
I found _____ shapes in nature.



OBSERVING **Shapes in Nature—natural and man-made**

Activity Sheet #2

NAME _____



Post test #2

Shapes: triangle, heart-shape, spiral, cylinder, rectangle, circle, kidney-shape

I know these shapes.

☐


INFERRING:

Rationale:

To help children do careful, critical reasoning from their observations. The children will practice distinguishing between what they can observe with their senses and what they can infer from their observations.

Instructional Objective:

Each student will learn to make inferences from his observations.

Vocabulary:

inference, observation, probably

Pretest:

Not needed.

Background:

Teach the lessons from the S.A.P.A. Science Manual C on Inferring.

Activity:

1. Give each student a ditto with the following information. After they have had time to investigate, come together and discuss.

A. Observation: two cardinals

- one is bright red and very colorful
- the other is dull red.

Inference: Which is the male?
Why is the male brighter in color?
Is there any advantage for the female to be dull in color?
Does this apply to the robin, blue jay?

B. Observation: birds make sounds — some sing.

Inference: Why do birds sing?

C. Observation: fallen log

Inference: What will be under the log?

D. Observation: small hole in the ground

Inference: What made that hole?
Does an animal live in there?
What animal lives there?

E. Observation: small holes in tree

Inference: Who made them?
What was he trying to get?
Why does a woodpecker peck on a telephone pole?

INFERRING:

Activity sheet #1

NAME _____

A. Observation: two cardinals

- one is bright red and very colorful.
- the other is dull red.

Inference: Which is the male?
Why is the male brighter in color?
Is there any advantage for the female to be dull in color?
Does this apply to the robin, blue jay?

B. Observation: birds make sounds — some sing

Inference: Why do birds sing?

C. Observation: fallen log

Inference: What will be under the log?
What will the ground be like under the log?
What happened to the log?

D. Observation: small hole in the ground

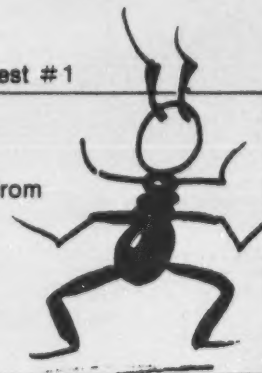
Inference: What made the hole?
Does an animal live in the hole?
What animal lives there?

E. Observation: small holes in a tree

Inference: Who made them?
What was he trying to get?
Why does a woodpecker peck on a telephone pole?

Post test #1

I can make inferences from my observations.



COMMUNICATING:

The mosquito

Rationale:

It is important that each student become acquainted with the insect world and a common insect of the O.E.C. and Rocky River backyards is the mosquito.

Instructional Objective:

Given instruction, each student will be able to recognize and write five facts about the mosquito.

Pretest:

Not needed.

Vocabulary:

larva, pupa, adult, stage

Background:

MOSQUITO Mosquitos are common in most parts of the world. In temperate climates, they seem to appear suddenly when the weather turns hot. The mosquito lays its eggs on a damp surface. The eggs look like tiny black specks. If the water begins to dry up, the eggs will dry up, but they will not die. They will hatch when they become wet again. Mosquitos lay their eggs in any kind of water from the dew on leaves and grass to water in puddles and ponds to water standing in old cans.

Since mosquito eggs are so small, they are hard to find; so, look for black specks on sticks, and leaves near any surface of water. If you find some black specks, you may want to take them back to the classroom and watch them hatch. Put them in a low container of water and wait a few days and see what happens in the warm classroom.

Take some magnifying glasses into the field, to help you find these black specks.*

The children may be surprised to see what hatches from the specks. Out will come a little wiggly thing that doesn't look like an adult mosquito at all. It is called a "wiggler" and is the second stage or larva of the mosquito.

Have the children use the magnifying glasses again and make some observations or try to answer these questions.

- Which end is the head?
- Can you find any legs?
- Does a wriggler have legs?
- How do they move?

When you see some wigglers, add some crushed dog food or yeast to the water every few days. If scum forms on the water, clean it off. After a few days you may find some larval skins floating on the water. As a larva grows it sheds its skin four times.

After a few weeks you will begin to notice black things that are like comr:as in the water. These are wigglers that have managed to live long enough and grow big enough to reach the next stage of development — the *pupa* stage.

Inside the covering of the pupa, legs and wings begin to form. When the mosquito is ready to come out, it pumps air into its stomach. This makes its body get larger and larger until the pupal covering breaks along a slit in the back. The mosquito can then step out onto the surface of the water and walk away from its pupal skin. It takes about an hour for the wings to dry and then it can fly away.

Unless you want mosquitos flying around the room, you had better be sure your pupae are in a jar with a screen or netting on top.

The mosquito has two wings, two eyes, two feelers or antennae, and six legs which makes it a member of the insect family. One of the best ways to tell a male and female mosquito apart is by the two feelers or antennae. A male's antennae are very bushy, while a female's have fewer hairs. The mosquito uses his antennae for feeling, tasting, and hearing.

Only the female mosquito bites. She needs the blood in order to be able to produce eggs. Most mosquitos fly only at night. If they came out during the day, they would be dried out or killed by the heat of the sun. In the daytime, they hide in the grass. Mosquitos can be found in the daytime in woods where it is cool and damp.

Mosquitos normally die of old age after 10-40 days. They are food for other insects, fish, birds, bats, frogs, and spiders. Cold weather kills the mosquito, but the female can lay eggs that will live through the winter waiting for the warm sun of spring.

Instructional Procedure:

Read the above information to the children and discuss it with them. Be sure to take magnifying glasses and containers with you on your trip to the O.E.C.

Activity:

- #1. Each student will try to find a mosquito or some black specks on leaves or stems. Put

the leaves or stems into a container to take back to the classroom.

- #2. Each student will receive a dittoed print of the mosquito to help him in identification.
 - a. Each student will label the body parts.
 - b. Each student will state the four life stages of the mosquito.
- #3. The student will write five facts about the mosquito.
 - a. This can be done back in the classroom.
- #4. The student will receive a ditto with the following observations and inferences. This can be a lesson in the classroom.

Observation: dog food in the water

Inference: Does the wriggler eat the dog food?
What will happen to the dog food?
Why was the dog food put in the water?

Observation: The male has bushy antennae.

Inference: Why does the male have bushier antennae than the female?
Is hearing more important to the male than to the female?

Observation: A chart stating the number of times an animal was bitten by a mosquito.

Observation: Animal	No. times bitten
cow	238
goat	125
pig	69
man	24
dog	17
cat	18
chicken	9

Inference: Why were cows and goats bitten more than dogs and cats?
Why was the chicken bitten the least?

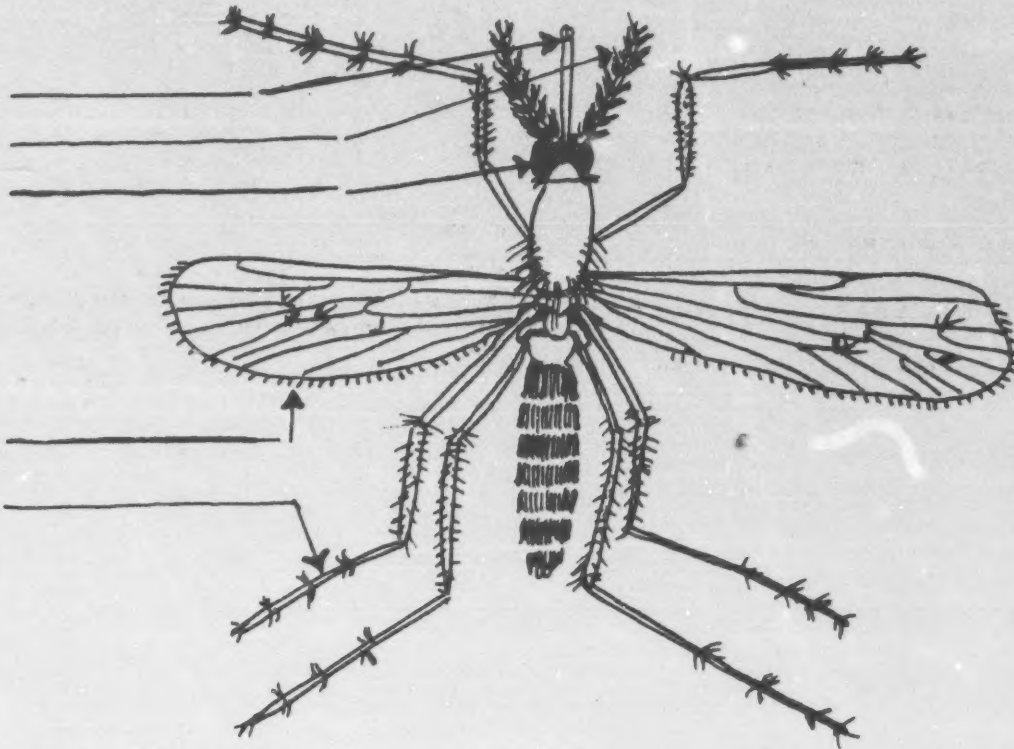
COMMUNICATING

The mosquito

Activity Sheet #2

NAME _____

1. The parts of the mosquito are:



2. The four life stages of the mosquito are:

Post test #2

1. I know the parts of a mosquito. ☐

2. I know the four life stages. ☐



COMMUNICATING The Mosquito

Activity Sheet #4

NAME _____

Observation:

Dog food in the water

Inference:

Does the wriggler eat the dog food?

What will happen to the dog food?

Why should you crush the dog food?

Why was the dog food put in the water?

Observation:

The male has bushy antennae.

Inference:

Why does the male have bushier antennae than the female?

Is hearing more important to the male than to the female?

A chart stating the number of times an animal was bitten by a mosquito.

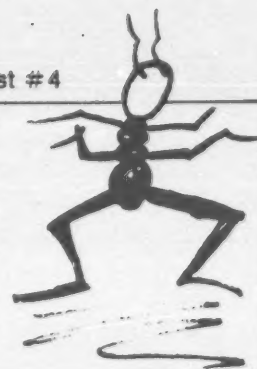
Animal	No times bitten
cow	238
goat	125
pig	69
man	24
dog	17
cat	18
chicken	9

Inference:

Why were cows and goats bitten more than dogs and cats? Why was the chicken bitten the least?

Post test #4

I can make inferences
from my observations.



COMMUNICATING The Food Chain

Rationale:

The students should be aware of the interdependence of living things upon each other.

Instructional Objective:

Each student will be able to explain and draw a simple food chain involving the mosquito.

Pretest:

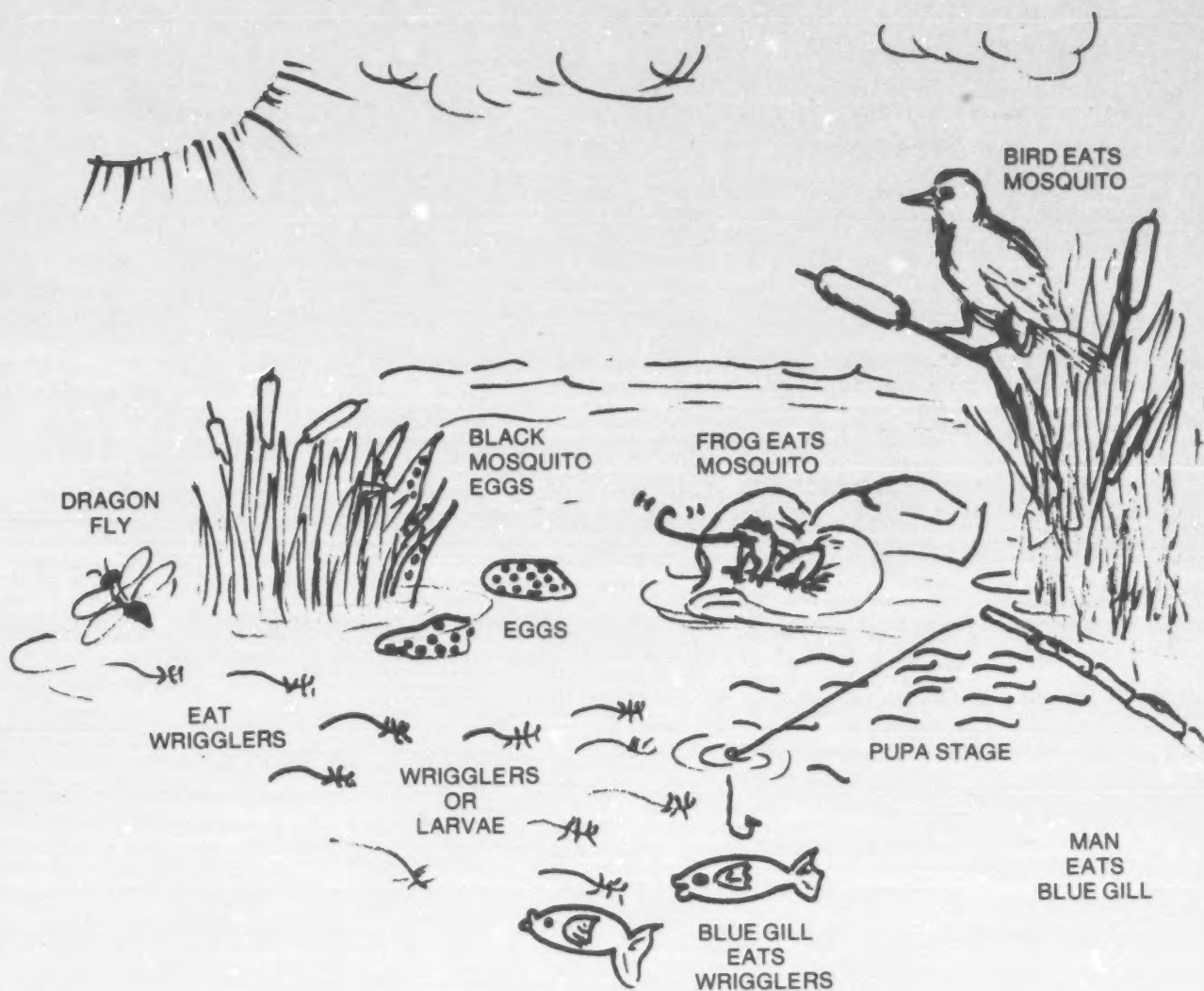
Not Needed.

Vocabulary:

consumer, prey

Background:

The food chain is a naturally occurring network of living animals and plants eating and being eaten.



Instructional Procedure:

Have a discussion about a food chain and make up several chains involving the mosquito.

Examples:

mosquito eggs → wrigglers → blue gills → man
grow into eaten by eaten by

mosquito eggs → wrigglers → frogs → other small animals & birds
grow into eaten by eaten by

mosquito eggs → wrigglers → dragonflies → birds & frogs
grow into eaten by eaten by

Activity:

#5. Have each student make up a food chain of his own involving the mosquito. He may want to draw a picture of the food chain. This activity can be done in the classroom.*

#6. Have students make a list of "consumers" of wrigglers; a list of "consumers" of mosquito. An activity sheet is not needed.

Post test:

#5. When the student can successfully draw a food chain.

*No activity sheet is needed for this exercise. The student can use drawing paper.

ECOLOGY LEVEL 3

A note to All Teachers and Volunteers Using Ecology Level 3

The following pages are filled with background materials, ideas and activity sheets for the Level 3 teacher to correlate with her S.A.P.A. science Manual D. The activity sheets have been so designed to provide ample room for the children to color them. Encourage the children to do this; it is another way to make students aware of the color in nature and help them to become more astute in their observations.

If at any time the teacher feels the student knows the subject matter, move him on to the next activity or on to the next grade level. Some activities have post tests. When the student successfully completes the activity, the teacher or accompanying adult will put a "Smile" on the face of the Ladybug. This ladybug will be found on all Level 3 activity sheets.

CLASSIFYING: Trees and Leaves

Rationale:

To increase Level 3 students knowledge of the trees of the O.E.C.

Instructional Objective:

Given instruction at the O.E.C. the student will recognize these trees: white ash, wild black cherry, pin oak, white oak, and hemlock.

Pretest:

Prior to instruction, hold up pictures of the above trees to see if students can identify them. If students are familiar with these trees, move on to the next activity or on to the list of trees for Level 4.

Vocabulary:

foilage, pyramidal

Background:

WHITE ASH A tall shade tree with long droopy leaves with short stemmed leaflets. The compound leaves grow opposite one another along the branchlets. Its purple flowers grow in tight clusters close to the twig. It flowers in late spring and has fruit in late fall. The fruit has narrow flat wings with a seed at one end; very similar to the maple seed. It provides a hard durable wood, good for furniture, tennis rackets, and baseball bats.

WILD BLACK CHERRY One of our finest and most valuable forest trees its hard wood is of high quality for use in furniture. It also bears a delicious fruit, which is eaten by animals, birds, and man. The smooth brownish bark on young trees becomes cracked into rough plates as the tree matures. The leaves are thick, narrow, tapering and shiny green.

PIN OAK An oak of medium size that is found in lowlands and in moist woods; its upper branches grow up, and the lower branches bend downward. It has a simple deeply lobed leaf with a point at the end of each lobe. It has a small, squat acorn.

WHITE OAK A tall, broad tree of the dry or moist woods; it has a simple leaf with deep rounded lobes. The bark is usually light and smooth. The acorn cap is bowl-shaped, covering $\frac{1}{2}$ of the acorn. The acorn is sweet and matures in one year.

HEMLOCK This is one of the best known and one of the easiest evergreens to identify. It is like the robin among birds. There are few trees more attractive to the eye. This lovely, lofty, evergreen is pyramidal in shape with feathery, dark foilage. Its needles are about $\frac{1}{2}$ inch long and spread out on either side of the branchlet to give a "flat" appearance to the leaf spray. The tiny cones, about an inch long, hang on the tips of the branchlets through the year and the brown cones of the previous season and the green cones of the current season often are found on the tree at the same time. The hemlock may grow to 100 feet tall with a trunk diameter of three to four feet. It is a fast grower and is a fine source of wood pulp for the paper and plastic industries.

Instructional Procedure:

Before students go out into the field, show them pictures of the above trees. Also review trees from Level K, level 1, and Level 2: sassafras, tulip poplar, oak, maple, willow, shagbark hickory, American linden, black locust, staghorn sumac, white pine, cucumber tree, American elm, gray birch, American beech and scotch pine.

Activity:

- # 1. Each student is given a dittoed print of the trees to be identified. While in the field, he will compare the drawing to the actual tree found along the hiking trail at the O.E.C.

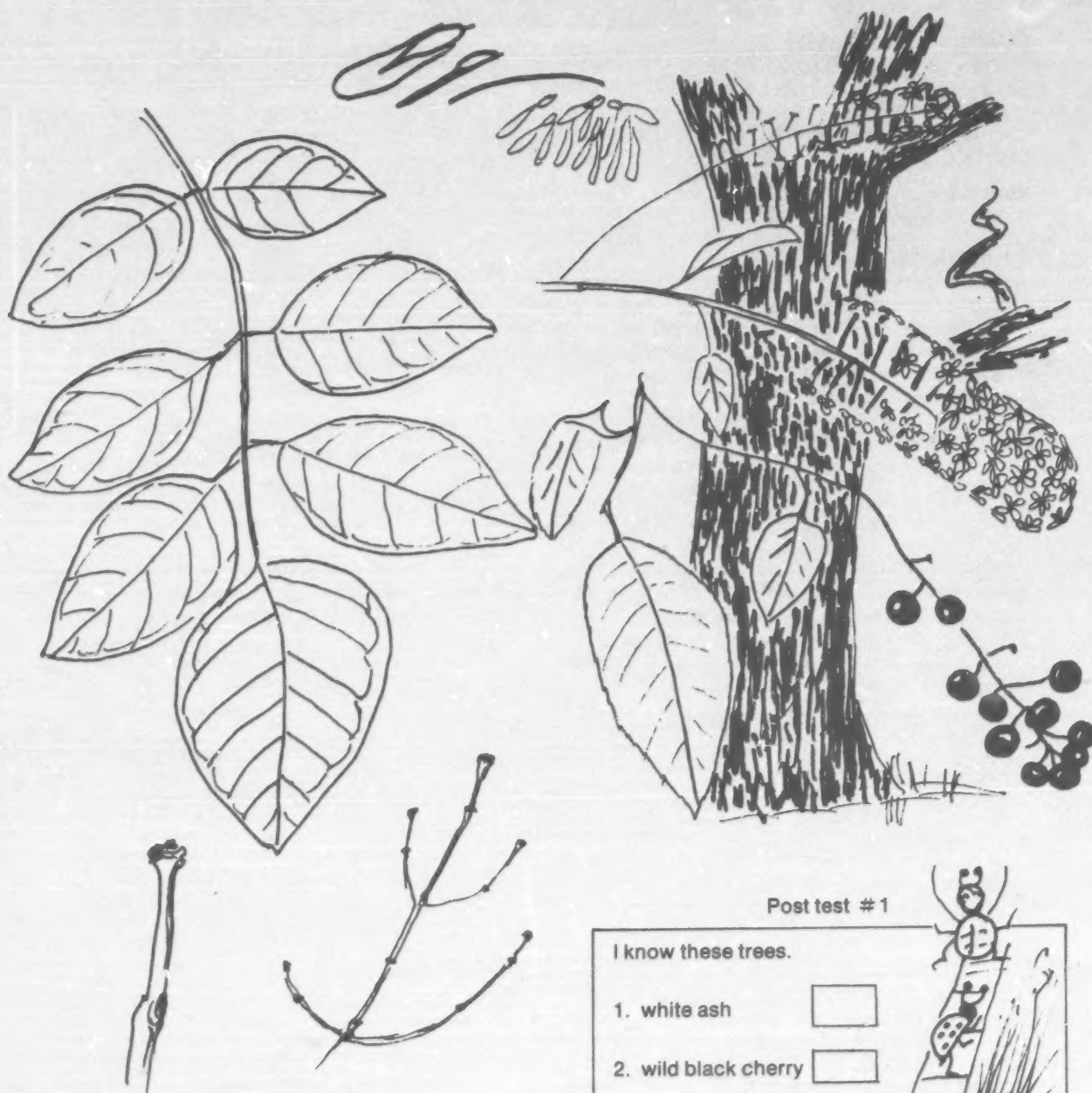
CLASSIFYING Trees and leaves

Activity Sheet #1

NAME _____

1. white ash

2. wild black cherry



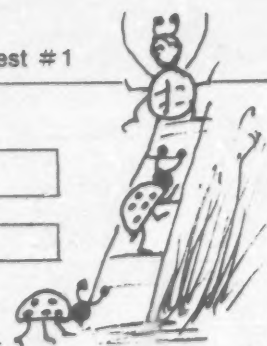
Post test #1

I know these trees.

1. white ash

☐

2. wild black cherry

☐

CLASSIFYING Trees and leaves

Activity Sheet #1

NAME _____

3. white oak



4. hemlock

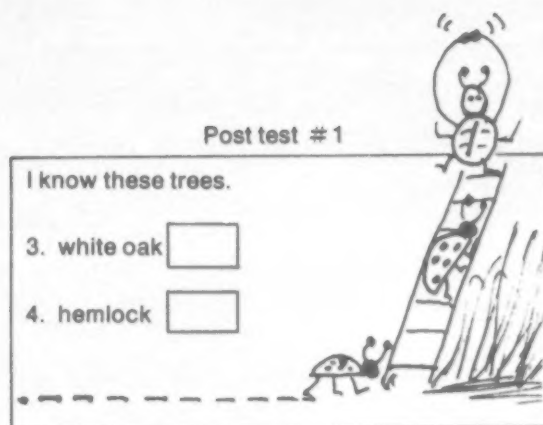


Post test #1

I know these trees.

3. white oak ☐

4. hemlock ☐



CLASSIFYING Trees and leaves

Activity Sheet #1

NAME _____

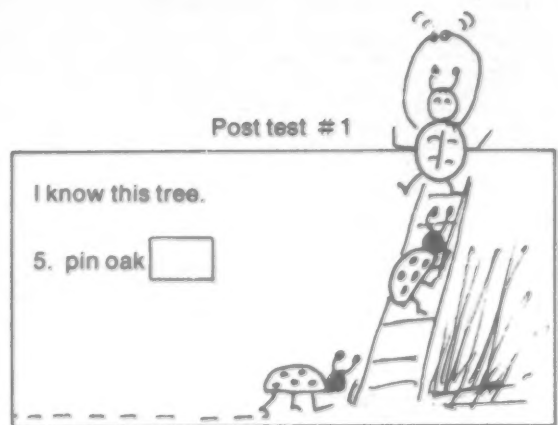
5. pin oak



Post test #1

I know this tree.

5. pin oak ☐



CLASSIFYING: Leaves

Rationale:

To give students further background in classifying leaves.

Instructional Objective:

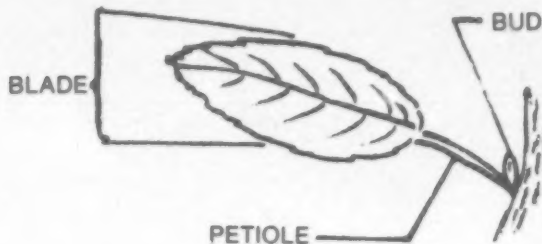
Given instruction each student will be able to decide if a leaf is a simple or a compound leaf.

Pretest:

Not needed.

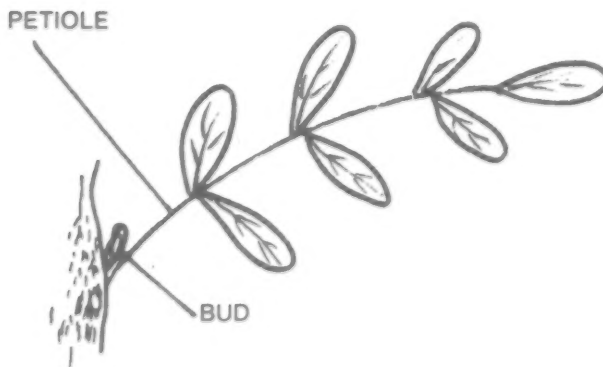
Background:

SIMPLE LEAF A simple leaf has one single blade attached to a stem or petiole. You will find a bud at the point where the stem joins the twig.



SIMPLE LEAF — BASSWOOD OR LINDEN

COMPOUND LEAF A compound leaf has many blades called leaflets growing from a single stem (petiole). A leaflet does not have a bud. Buds occur where the stem joins the twig.



COMPOUND LEAF — ASH

Instructional Procedure:

With the use of the overhead, show students a variety of leaf prints or dried leaves and discuss with the children whether the leaves are simple or compound.

Activity:

- #2. Give each student a dittoed print of leaves and have the student draw a circle around all compound leaves.

Activity Sheet #2

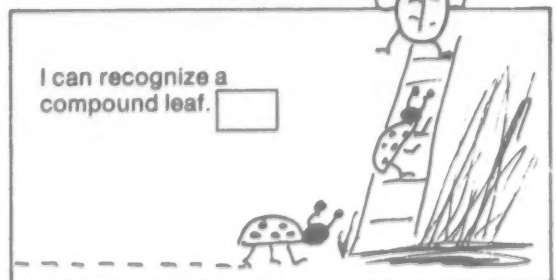
NAME _____

Circle all compound leaves

Post test #2

I can recognize a compound leaf. ☐

I can recognize a compound leaf. ☐



CLASSIFYING:

Wildflowers (Review K-2)

Rationale:

It is our hope that Rocky River students will develop a knowledge of and an appreciation for wildflowers.

Instructional Objective:

Given instruction the student will recognize these wildflowers: spring beauties, marsh buttercups, adderstongues, violets, trilliums, toothworts, wild geranium, wild strawberry, mayapple, Jack-in-the-pulpit, false Solomon's seal, Queen Anne's lace, and goldenrod.

Pretest:

Prior to instruction, hold up pictures of the above flowers. If the student is familiar with these flowers go on to the next activity.

Background:

SPRING BEAUTIES Found in open woods, spring beauties have delicate white flowers veined with a deeper pink. It only remains open to bright light and grows to be 10-12 inches high. These plants have starchy bulbs which the Indians use to eat. They bloom in early Spring.

MARSH BUTTERCUPS This pretty bright yellow flower grows in low moist places, meadow, and marshes. It can be a "creeper" or stand erect. It is seen in lawns or meadows from spring to fall.

ADDERSTONGUES This flower belongs to the lily family and blooms early in Spring. It has a delicate, small, lily-like flower in yellow, violet, or white, and grows in moist woodlands.

VIOLETS This is a low leafy plant with a pretty delicate flower ranging in color from white to blue to very deep purple. Not all violets have the typical heart-shaped leaf, some have deeply indented narrow leaves. Violets grow in the woodlands and are found in many states. They have a very nice fragrance and make a lovely bouquet.

TRILLIUM As their name implies, these flowers are constructed in threes: three leaflets, and three petals. The petals range in color from deep purple red through pink to pure white. The flowers ripen into reddish or purple berries. It belongs to the lily family and blooms about the second week in May.

TOOTHWORTS These slender plants thrive in moist woods. It has a tall smooth stem 6-15 inches high, bear toothed leaves, and small four petaled flowers — white or pinkish in color. The root tastes like watercress. It belongs to the mustard family and blooms in the late Spring.

WILD GERANIUM This is a tall slender plant, 20 inches high, with finely cut leaves. The flowers are five petaled: lavender pink and white. It blooms in spring and early summer. It belongs to the geranium family.

WILD STRAWBERRY This is a low growing plant, that grows best in sandy soil. It has a compound leaf with three serrate leaflets. Small white flowers grow and later become a sweet red fruit. These delicious berries are eaten by birds, animals, and boys and girls.

MAYAPPLE This flower is found in great abundance at the O.E.C. it has large umbrella-like leaves. It has a white flower and blooms in late spring. It is a member of the barberry family. The edible lemon-yellow fruit has a strawberry flavor, but the root, stem, and leaves are POISONOUS.

JACK-IN-THE-PULPIT This is an American wildflower that grows in moist woodlands and thickets. The loss of wooded areas in Rocky River has resulted in a scarcity of this attractive flower. This flower has been well named. The part that looks like the preacher is a slender stalk called the spadix. The tiny greenish-yellow flowers grow in a club-shaped spike on the upper part of this stalk. The "pulpit" is a leaflike growth which encloses the spadix like a trumpet. The oddly shaped flowers bloom from April to June, and then produce clusters of smooth, red berries. The plant grows from a turniplike root filled with starchy juice. The juice sometimes used in homemade cough medicine, has a stinging bitter taste. The root is tasteless when boiled, but it is a nourishing food. It is also called Indian turnip.

FALSE SOLOMON-SEAL The small starry white flowers of this plant form a cluster at the end of the stem. The flowers ripen into small red or bronze berries. It blooms in the late spring and early summer; and belongs to the lily family.

QUEEN-ANNE'S LACE This flower is also called wild carrot, for its leaf resembles that of a carrot leaf. It is a member of the parsley family. This large white lacy flower is really a cluster of tiny white flowers. It grows in great quantity in Rocky River and at the O.E.C. It blooms in summer and fall. Many people dry it and use it in lovely bouquets.

GOLDENROD This plant is easy to identify for it is the tall yellow flower we see growing along roadsides or in open fields in summer and fall. The tiny flowers are clustered along the stem. Some people are sensitive to its pollen. There are over 125 species of golden rod that grow in this country.

Instructional Procedure:

Prior to the field trip, review all those flowers that the students did not recognize.

Activity:

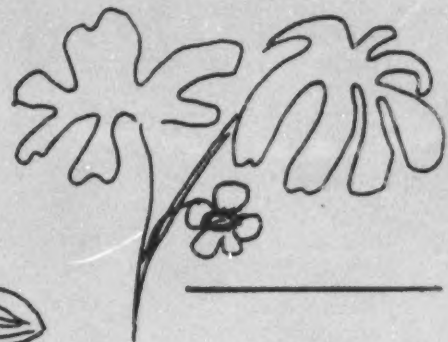
- #3. Each student is given a dittoed print of the wildflowers he needs to help him in identification.

CLASSIFYING Wildflowers (review)

Activity Sheet #3

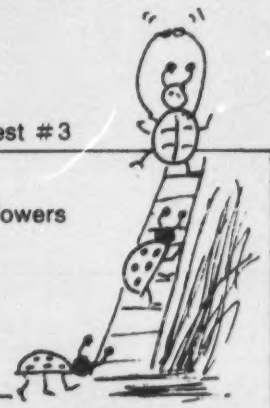
NAME _____

Name the wildflowers



Post test #3

I know the above wildflowers
of the O.E.C. ☐



CLASSIFYING:

Vines

Rationale:

To inform students which vines of the O.E.C. produce poisonous berries and which vines produce berries that are edible by small animals, birds and man.

Instructional Objective:

Given instruction at the O.E.C., the student will be able to recognize the vines: deadly nightshade, blackberries and dewberries.

Pretest:

Prior to instruction show students a picture of the above vines and ask students to identify the plants.

Background:

DEADLY NIGHTSHADE Many plants belong to the nightshade family: herbs, shrubs, potatoes, eggplant, and tomatoes. People once thought that the tomato was a poisonous plant. Although this is not true about the tomato; it is true for another member of the nightshade family, which is called "deadly" nightshade. The deadly nightshade is found at the O.E.C and sometimes in our backyard.

The deadly nightshade is a creeping vine that has a blue flower and a dark blue fruit. It is this fruit that is poisonous to some people. Other common plants that are members of the nightshade family are tobacco and petunias.

Since deadly nightshade is often found where raspberries, blackberries, and dewberries grow; it is important that students know which plants produce edible berries and which plants do not.

BLACKBERRIES This is an upright or arching shrub with strongly angular stout-prickly stems. Leaves have 3-5 leaflets. It has a white flower which blooms in May-July, and a tasty black fruit which is ripe in late August. This fruit provides food for small animals, birds, and man.

DEWBERRY This is a trailing shrub with densely glandular-bristly round stems. Leaves are shiny, leathery, often evergreen with 3-5 fan shaped blunt-toothed leaflets. A white flower blooms in summer and a black berry is present in late August, early September.

Instructional Procedure:

Show pictures of the above vines and their fruits to the students. Stress to the students that the deadly nightshade is *poisonous*.

Activity:

- = 4. Each student will receive a dittoed print of these vines to help him in identification: deadly nightshade, blackberry, dewberry.

CLASSIFYING Vines

Activity Sheet #4

NAME _____

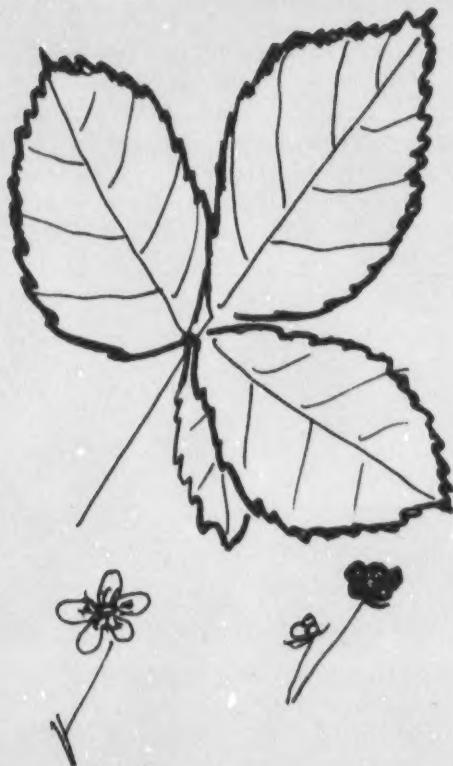
1. deadly nightshade



2. blackberry



3. dewberry



Post test #4

I know these vines.

1. deadly nightshade ☐

2. blackberry ☐

3. dewberry ☐



CLASSIFYING: BIRDS

Rationale:

Children should be aware of the importance of birds to our ecology. They should have an opportunity of experiencing the joy of listening and observing birds in a natural setting.

Instructional Objective:

Given instruction at the O.E.C the student will recognize these five birds: ring-necked pheasant, wren, chickadee, nuthatch, and brown thrasher.

Pretest:

Prior to instruction, hold up pictures of the above birds for students to identify.

Vocabulary:

plumage

Background:

RING-NECKED PHEASANT This large bird is easy to identify by its colorful plumage, and its long beautiful pointed tail. The male is unrivaled in coloring. The female is smaller, dull brown and white, with a shorter pointed tail. It is a favorite game bird of the farmlands and it feeds on grain. It is a bird that was introduced to this country from Asia, and is now found in most areas of the United States.

WREN This is a small brown bird which usually carries its tail erect. It has a long bill and eats small insects bugs, beetles, and caterpillars. This little bird is found in woodlands, farmyards, and in cities. Many people have a wren house in their backyards.

CHICKADEE This bird is a constant visitor of feeding stations. It is quite tame and can sometimes be trained to take food from the hand. The chickadee is a small active bird with a black bib and a black cap. It has a short bill suited for seeds and its name is its call—chick-a-dee.

NUTHATCH This is a pretty blue bird with white sides of the head, throat, and breast. It has strong claw-like feet and can creep down tree trunks head first. Its long narrow bill is suited for eating beetles, ants, other small insects, and seeds. It is one of the few birds that stores its food.

BROWN THRASHER This bird is a handsome, chestnut, brown above and streaked with brown below. It has a long tail and a curved bill. It lives in bushes, vines and low trees. It lives on beetles, grasshoppers, caterpillars, acorns and wild fruit.

Instructional Procedure:

Before children go out to the site, show them pictures of the above birds. Review the birds from Level K, Level 1, and Level 2: robin, blue jay, cardinal, crow, pigeon, redwinged blackbird, grackle, mourning dove, red-headed woodpecker, song sparrow, junco, hairy woodpecker, flicker, and the goldfinch. Discuss how each bird is adapted to survive in his environment.

Activity:

- #5. Give each student a dittoed print of the above birds to help him in identification: ring-necked pheasant, wren, chickadee, nuthatch, and brown thrasher.
- #6. Have a question and answer session with your students. Below are some questions they might ask about birds that they have observed at the O.E.C.
 - a. Why does a bird shake itself?
Sometimes it shakes to get all of its feathers lined up in proper order. At other times a bird will shake itself to get water or any other substance off its feathers.
 - b. What happens when a bird's feather is pulled out? A new feather to replace the missing one starts to develop at once.
 - c. How do birds know when it is time to migrate? Just before the spring migration, birds become restless because hormone changes in their bodies prepare them for mating. The length of daylight hours, the availability or scarcity of food and weather conditions that are favorable for migration all influence the time when birds depart for their summer or winter home.
 - d. How much food do birds require? In proportion to their size, a great deal. Some birds that feed on insects eat up to 40 per cent of their weight each day.
 - e. Do birds have teeth? No.
 - f. How does a woodpecker locate insects? He taps on a dead tree to disturb them. When they start moving about, he can pinpoint them by his very sharp sense of hearing.
 - g. Do all birds build nests? No.
 - h. What bird builds a nest so tightly constructed that it will hold water? The American goldfinch — his nest will hold water for about twenty-four hours.
 - i. Can birds recognize their own eggs? Many species cannot recognize their own eggs, a fact which makes it easier for a cowbird to lay its egg in another bird's nest.

CLASSIFYING Birds

Activity Sheet #5

NAME _____

1. chickadee

2. wren

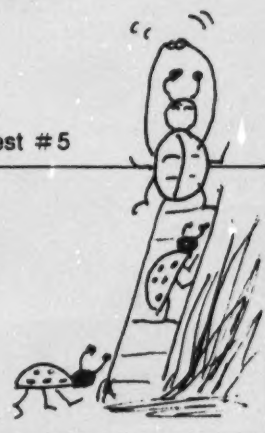


Post test #5

I know these birds.

1. chickadee ☐

2. wren ☐



CLASSIFYING Birds

Activity Sheet #5

NAME _____

3. nuthatch



4. brown thrasher



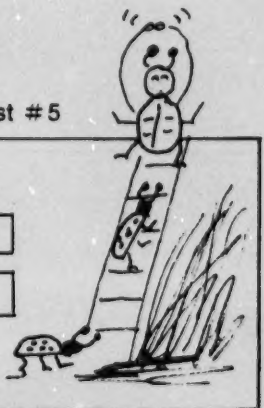
Post test #5

I know these birds.

3. nuthatch

☐

4. brown thrasher

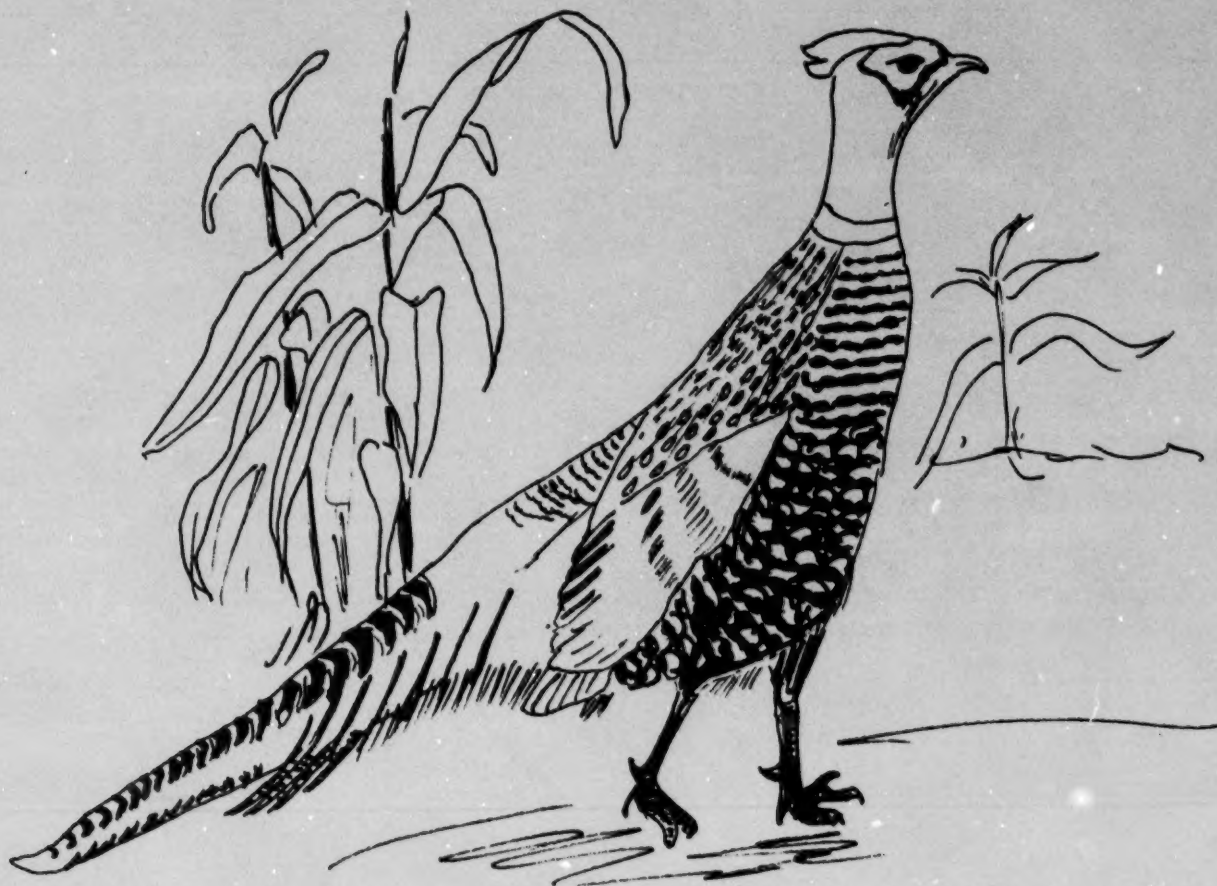
☐

CLASSIFYING Birds

Activity Sheet #5

NAME _____

5. ring-necked pheasant



Post test #5

I know this bird.

5. ring-necked
pheasant

☐

104

CLASSIFYING:

Animals — Raccoon

Rationale:

To give the students background on the animals that make their home in the O.E.C.

Instructional Objective:

Given instruction the student will be able to recognize and write five facts about the raccoon.

Pretest:

Prior to trip show student picture of a raccoon and ask students to identify and write five facts about it. If the student recognized the raccoon and can write the five facts about it, go on to the opossum.

Vocabulary:

nocturnal

Background:

RACCOON The word "raccoon" comes from an American Indian word meaning "feeler" or "hand scratcher". The raccoon has sensitive toes. With its handlike front feet a raccoon feels for insects in hollow logs or for fish in water. Raccoons seem to enjoy playing with pebbles or stones, rolling them about with their feet.

Brownish gray in color, a raccoon has a long bushy tail with several dark bands. Its face is small and pointed. The coloring of the fur around the eyes make the raccoon look as if it were wearing a mask.

Raccoons live in wooded areas, usually near water. They are nocturnal which means they are active at night. They eat a variety of food; fish and insects as well as fruits and berries. They are often found very close to where people live. In

some areas they are considered pests, for they may raid farms to feed on young corn. Every now and then they may steal a chicken. In Rocky River, raccoons live in the sewers. They are experts at removing lids from garbage cans to get to the scraps inside.

If they are near water, raccoons wash their food before eating. No one knows just why they do this. Some say it is to remove mud or grit or to get rid of irritating gland secretions on the skin of such animals as toads and frogs.

Although raccoon are usually gentle animals, they can be fierce fighters. Furiously clawing and biting, a raccoon can beat a dog twice his size.

Raccoons are good climbers and make their family homes in hollows high up in trees. In cold climates the raccoon will sleep away the worst winter days, coming out only when it is warm.

A mother raccoon bears two to six young. Usually she raises the cubs by herself. Mother and cubs live together in the den until they can take care of themselves. Raccoons sleep during the day and are active at night; they hunt in the trees as well as on the ground.

Instructional Procedure:

Read the above information and discuss it with the children. Perhaps they have a raccoon family in the sewers near their home.

Activity:

#6. Each student will receive a dittoed print of a raccoon and he will write five facts about the animal.

CLASSIFYING Animals—raccoon

Activity Sheet #6

NAME _____

Write five facts about the raccoon.

1. _____
2. _____
3. _____
4. _____
5. _____



Post test #6

I know five facts
about the raccoon.

☐

CLASSIFYING:

Animals — Opossum

Rationale:

To give the students background on the animals that make their home in the O.E.C.

Instructional Objective:

Given instruction the student will be able to recognize and write five facts about the opossum.

Vocabulary:

marsupial

Background:

OPOSSUM When full grown, the common opossum is about the size of a house cat. The head is small, but it has a long narrow jaw set with 50 teeth. The feet are five toed. Each toe on the forefoot has a long sharp nail that helps in climbing trees. Four toes on the hindfoot also have nails. The nailless first toe is used like a thumb to grasp branches. The tail, long and rat-like, also helps in climbing. There are two coats of fur; the inner coat is soft and short, and the outer is coarse, long, and a grizzled gray in color.

During the day the opossum sleeps in a burrow, brush pile, hollow log, or tree. At night it hunts in trees or on the ground. It grows fat from eating birds, frogs, fish, eggs, insects, and fruit. It climbs to the tips of branches to get cherries and mulberries. Its slowness makes it an easy prey of owls, wolves, foxes, and bears.

The peculiar way in which the opossum rears its young sets it apart from all other American animals. As many as a dozen are born at a time, each about half an inch long. Immediately they crawl into a pouch on the mother's abdomen. There they fasten themselves to the milk glands and remain helpless for about six weeks. When they first come out of the pouch they are the size of mice. For some time after that they ride around on their mother's back clinging to her fur and crawling back into her pouch to sleep. The kangaroo of Australia raises its young in the same manner.

Hunting the opossum with dogs is a favorite sport in the South on autumn nights. When surprised by the hunter, the opossum pretends to be dead. From this trick has come the expression "playing 'possum".

Instructional Procedure:

Read the above story about the opossum to the children. Perhaps your library has a filmstrip about the opossum. Explain to the children that since the opossum is a night creature, they will probably not find one on their visit to the center. Assure them that opossums do live at the site, and perhaps they will find the home of an opossum.

Activity:

- # 7. Each student will receive a dittoed print of the opossum and write five facts about the animal.

CLASSIFYING Animals—opossum

Activity Sheet #7

NAME _____

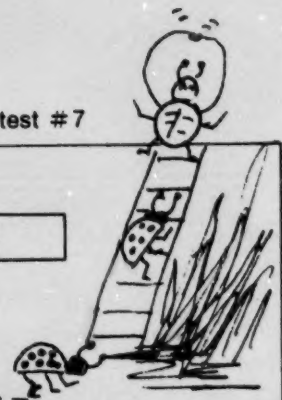
Write five facts about the opossum.

1. _____
2. _____
3. _____
4. _____
5. _____



Post test #7

I know five facts
about the opossum.

☐

108

COMMUNICATING:

Using Maps

Rationale:

To give each student more experience in reading and interpreting maps.

Instructional Objective:

With the aid of a map, the student will find an old well and a tree in the shape of a backward 4 that is located at the O.E.C.

Pretest:

Not needed.

Instructional Procedure:

Prior to your trip to the O.E.C., teach the lesson on Using Maps in the S.A.P.A. Science Manual D.

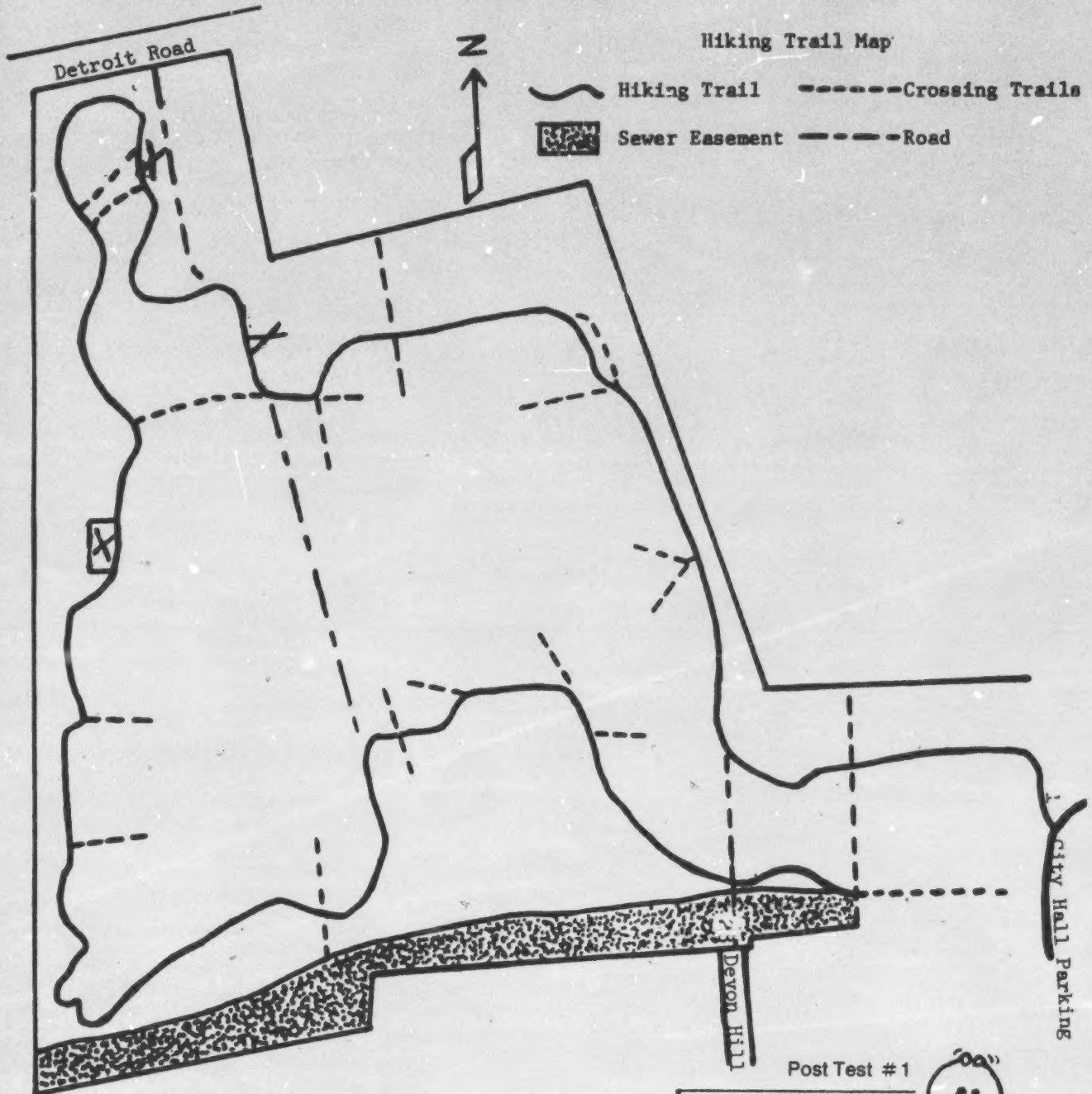
Activity:

- #1. Given a map the student will find the old well and the tree in the shape of a backward 4, located at the O.E.C.

COMMUNICATION Using Maps

Activity #1

NAME _____



Post Test #1

I found the well and
the tree by using my
map.



INFERRING:

Rationale:

To continue to give students additional practice in making observations and help them to draw logical conclusions. To help them develop a critical attitude toward their own references.

Instructional Objective:

The student will make observations and inferences about the old well and the tree in the shape of the backward 4.

Pretest:

Not needed.

Background:

Have the students state their observations about the well, then have them make some inferences. Below are some questions that may help start the discussion.

Observation: A hole in the ground bounded by a cement cap or lid
What is in this hole?
How deep is this hole?
How deep is the water in this hole?
What objects can be seen floating in the well?

Inferences: Why is the well located where it is?
Is the water safe to drink?
What animals may have fallen into the well?
How was the well constructed?
Was it dug by hand, or drilled?
Where does the water come from that is in this well?
Does the well go dry during the dry seasons?
What is missing from this well?

Point out to the students that there is no right or wrong answer in making inferences.

Ask the students this question:

Suppose that you wanted to go further than an inference and investigate your inferences? How would you go about investigating them? Let's restate the inferences.

1. The water in the well is safe to drink. How can we prove this?
2. Mice, shrews, chipmunks, raccoons, and rabbits have fallen into the well. How can we prove this?
3. The well has water in it during the dry season. How can we prove this?

Instructional Procedure:

Prior to this lesson, teach the lesson on Observations and Inferences in the S.A.P.A. Science Manual D.

Activity:

- # 1. Each student will make some observations and inferences about the well.
- # 2. Each student will make observation and inference about the tree in the shape of the backward four. *

Post test:

For # 1 and # 2, back in the classroom have the student write a short paragraph about the well and the backward 4 tree.

* No activity sheet is needed for this activity.

INFERRING: What is under a log?

Rationale:

To give additional practice in inferring and to build an awareness and a curiosity for the insects and small animal life of the O.E.C.

Instructional Objective:

Each student will infer what animals he will find under a log. The student will make a list to keep for future discussions, when he is out in the field.

Pretest:

Not needed.

Background:

This is an excellent way to introduce a unit on insects and other animals that resemble insects.

The students list may include such creatures as: beetles, sow bugs, ants, spiders, centipedes, worms, larva, grubs, and snails.

Have the children investigate whether all the above animals are insects and if they are not insects what are they? Have the students learn what the characteristics of a true insect are? What family do spiders belong to and what are their characteristics?

Instructional Procedure:

Have the students write their inferences about the log in the classroom. Then while you are out in the field, have the students find a log. Turn it over and see what creatures really are found there. Have the student make additions and corrections to his list.

Activity:

- #3. Before the student goes out into the field, he will make a list of animals that he thinks he will find living under a log. While he is out in the field, he will compare his list to his findings.
- #4. The student will take a piece of the dead log or any piece of dead wood available, and with a hand lens examine it closely. Ask him what he found? Is the log really dead? Does anything live in it or on it? *

Post test

- #3 and *4. Back in the classroom, have each student write up his observations on what lives under a dead log, in it and on it.

* No activity sheet is needed.

INFERRING: Tracks and Traces

Rationale:

To give students experience in making inferences from tracks and traces, and to help them realize that they must constantly revise their inferences as they gather more information.

Instructional Objective:

Given instruction on animal and bird tracks that can be found at the O. E. C., each student will identify at least three tracks.

Pretest:

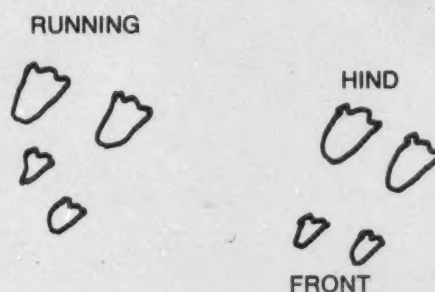
Not needed.

Background:

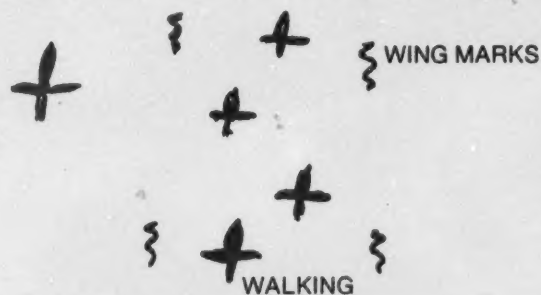
SQUIRRELS Four-toes front prints are about one-inch long. Five-toed hind prints are 2-2½ inches long. Sets of prints are 20-24 inches apart when running.



COTTONTAIL RABBIT Claws and toe pads seldom show because of hairy feet. Front prints are about one inch long. Hind prints are 4-5 inches long. Sets of prints are 1-7 feet apart when running.



PIGEONS Prints are about 2 inches long. The side toes are spread wide from the front toe, since pigeons do more walking than perching. Wing marks are sometimes left on snow when a bird flies from the ground.



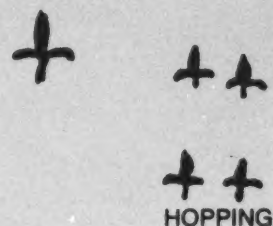
HOUSE CAT Four toes on all feet: no claw marks showing. Prints are about one inch long. In walking prints are 5-8 inches apart. Sets of prints are about 30 inches apart when running. The wild bobcat has prints about the size of a house cat.



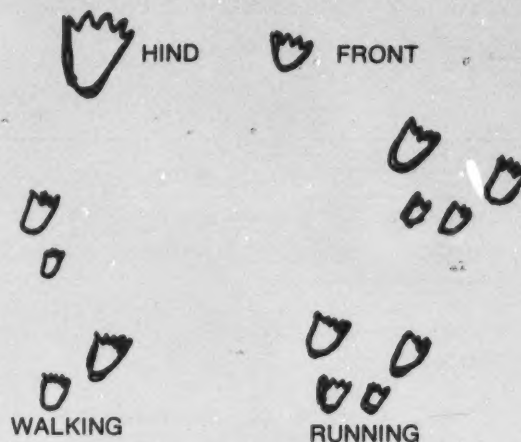
DOG Four toes on all feet: claw marks showing. Prints vary greatly in size depending on dog. Cocker spaniel prints are about 2 inches long. Alaskan husky prints, 4 inches long. Distance between prints when walking and running also depend on dog's size.



SPARROW Prints are about one inch long. Sparrows hop, leaving paired prints. Some other birds such as crows, starlings, and pheasant walk with prints in single file. Sparrows are perching birds; their side toes are not spread wide from the front toe.



RACCOON Five toes on all feet. Front prints resemble hands and are 2-3 inches long. Hind prints are 3-4 inches long. In walking sets of prints are 12-30 inches apart. Sets of prints are 2-3 feet apart when running.



Instructional Procedure:

Prior to this activity, teach the lesson on Tracks and Traces in the S.A.P.A. Science Manual D. With the use of the overhead, show the students a variety of prints that they might find at the O.E.C. This is a good activity for winter trips through the O.E.C. It is easy and lots of fun to find tracks in the snow.

Activity:

- #5. Given a dittoed print of animal and bird tracks of the O.E.C., the student will identify at least three.

INFERRING Tracks and traces

Activity Sheet #5

NAME _____

Under each set of tracks, write the name of the animal or bird that made them.





FRONT



HIND







HIND

FRONT





HIND

FRONT



Post test #5

I was able to identify 3
sets of tracks.

I was able to identify all
sets of tracks.



OBSERVING: Galls

Rationale:

To inform students as to the identity of those lumps or balls that they see on leaves, twigs, and stems.

Instructional Objective:

Given instruction, the student will be able to recognize a gall and explain what a gall is.

Vocabulary:

fungi, virus, bacteria, externally, pupate

Background:

GALLS Galls are abnormal plant growths. They appear as swellings of tissue found on roots, stems, leaves, flowers, and seeds of plants. These growths are formed externally by insects, fungi, virus, or bacteria. An insect selects a specific plant. As the eggs hatch, the plant tissues around the larvae begin to swell, forming a characteristic gall. The larvae feed on plant juices and pupate in the gall. The adult emerges by burrowing through the side. Some galls are large and woody, some soft, some knobby and spiny. Best known galls are the oak apples, and galls commonly seen on roses, blackberry and goldenrod.

Instructional Procedure:

As the students walk along the hiking path, have them collect a few galls. Gather enough of the host plant to identify it, and place the galls in a plastic container with some damp soil. The container top should be covered with cheesecloth; water should be added as needed to keep the soil damp. Perhaps, you will be rewarded by seeing the insects that made the gall hatch!

Activity:

- #1. Each student is given a dittoed print of some common galls to help in identification. Back in the classroom the student will write a paragraph explaining what a gall is.



ELLIPTICAL GOLDENROD GALL



OAK APPLE GALL



BLACKBERRY KNOT GALL

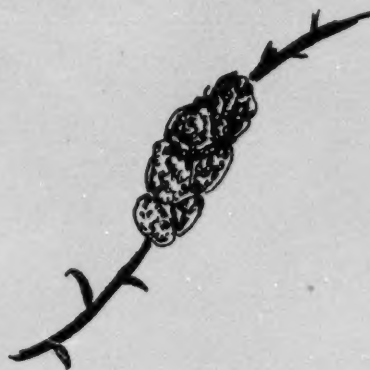
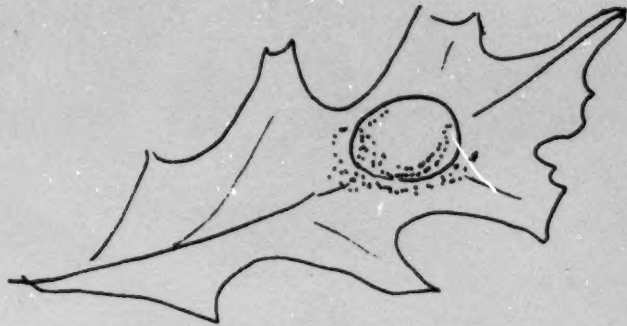
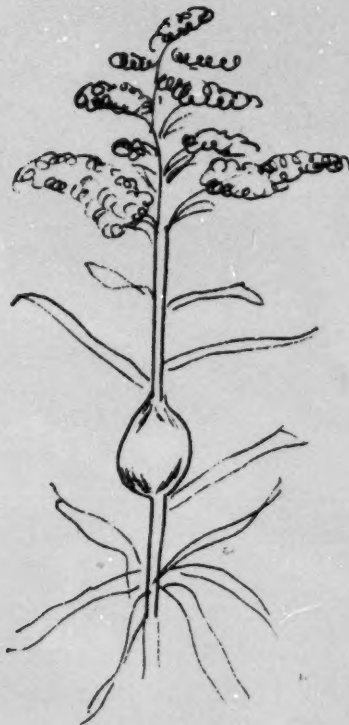
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OBSERVING Galls

Activity Sheet #1

NAME _____

Can you find galls that look like this?



Post test #1

I found one of the above galls. ☐

I found all of the above galls. ☐

I understand what a gall is. ☐



ECOLOGY LEVEL 4

118

DECIDUOUS TREES

There are many varieties of deciduous trees in the Outdoor Education Center. Before children can identify trees in the field, it is necessary that they have a good understanding of the terms used to describe leaves. It is important that they become informed of the parts of a leaf and leaf arrangements before going into the field.

I. Instructional Objectives

- A. The student will be able to distinguish between:
 - 1. Simple and compound leaves
 - 2. Pinnately and palmately compound leaves
 - 3. Pinnately and palmately veined leaves
 - 4. Leaves arranged oppositely or whorled.

II. Vocabulary

The terms below are illustrated on the drawings and examples are given. You may wish to make an overhead projection of the diagrams to better illustrate the material to your class.

- A. *Margin* — The border of a leaf.
- B. *Base* — The lower portion of the leaf, toward the leafstalk.
- C. *Apex* — The tip of the leaf.
- D. *Blade* — The broad part of a leaf that holds the green food-making cells.
- E. *Petiole* — The stemlike part of the leaf which holds the blade.
- F. *Midrib* — The central rib or main vein of a leaf.
- G. *Vein* — Branches of the plant's pipeline system, found in leaves. They are also the skeleton of a leaf and help the leaf to keep its shape.
- H. *Lobe* — Deep V's or other indentations along the margin of a leaf.
- I. *Sinus* — The indentation between two leaf lobes.
- J. *Simple Leaf* — A leaf that has only one blade, but may be lobed.
- K. *Compound leaf* — A leaf consisting of a number of separate blades called leaflets.
- L. *Leaflet* — A leaflike subdivision of a compound leaf.
- M. *Palmate* — Shaped like a hand.
- N. *Pinnate* — Shaped like a feather.
- O. *Palmately compound* — A compound leaf with leaflets radiating from a point.
- P. *Pinnately compound* — Midribs of main leaflets branching from a central main midrib at several points in a featherlike pattern.

- Q. *Palmately veined* — Main veins of a leaf radiating from a point.
- R. *Pinnately veined* — Main veins of the leaf are more or less at right angles to a main midrib. Featherlike arrangement of veins.
- S. *Alternate* — Leaves not opposite, but arranged singly at intervals along twig.
- T. *Opposite* — Two leaves opposite each other.
- U. *Whorled* — Leaves arranged in circles around the twigs.

III. Learning Mode

The field activities are best done in student pairs. The instructor may assign any one or more pairs of trees for comparison. The pairs to be compared are as follows:

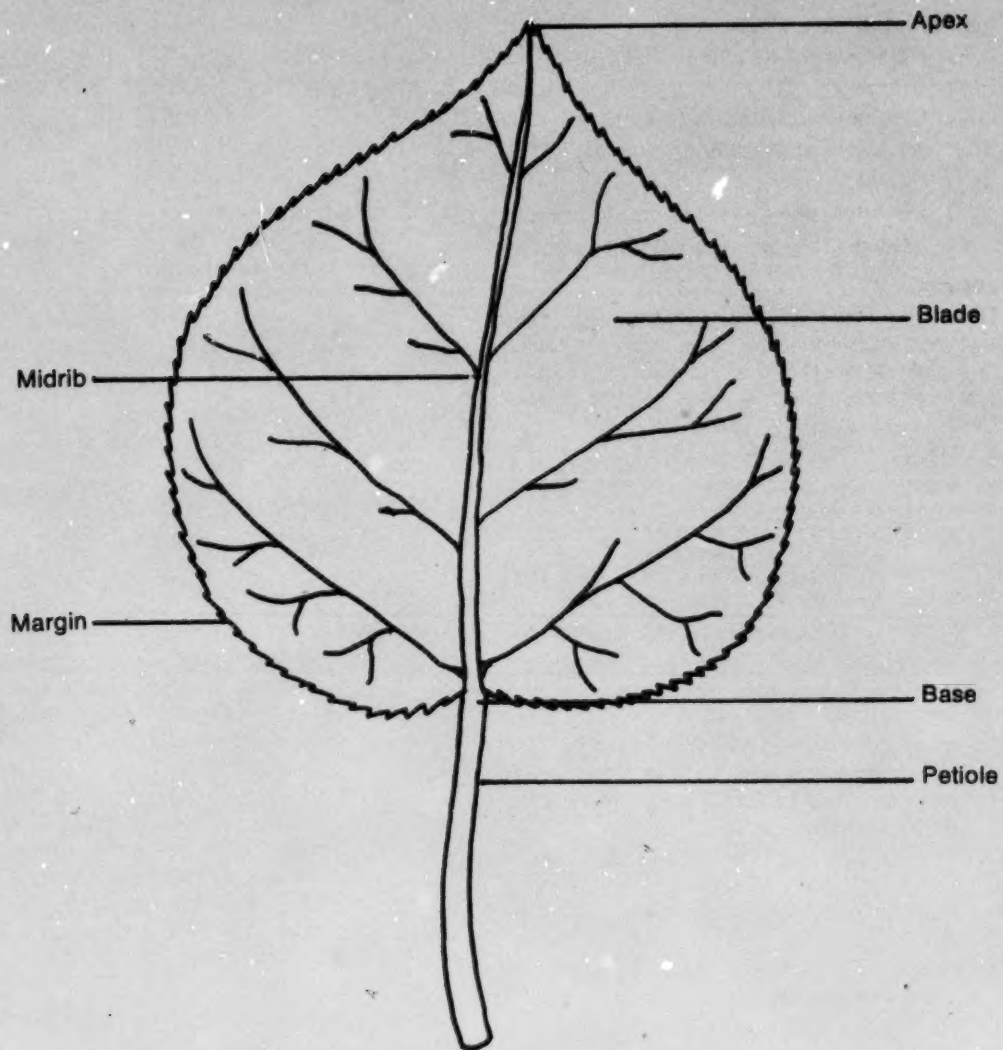
- 1. Box Elder & Red Maple
- 2. Black Locust & Staghorn Sumac
- 3. Wild Cherry & Catalpa
- 4. Eastern Cottonwood & Mulberry
- 5. Black Walnut & White Ash
- 6. Hawthorn & White Birch
- 7. White Ash & Black Locust.

IV. Classroom Activities

- A. Children may choose to draw pictures of any of the types of leaves that have been investigated. The leaves can be attractively mounted and labeled according to characteristics.
- B. Research may be done on any of the deciduous trees examined on the site. Illustrated oral or written reports may be done on the use of the tree: where it is found, what benefits it gives, etc.
- C. Leaves may be mounted and preserved in a leaf press.
- D. Leaves may be mounted on heavy cardboard and covered with clear Con-Tact paper which has been rolled or pressed to remove air spaces.
- E. Spatter prints of leaves can be made by pinning the pressed leaves to construction paper and scraping a toothbrush that has been dipped in paint, with a stick. This will cause the paint to coat the paper around the leaf, making a print of the leaf.
- F. Seeds from deciduous trees may be planted in well-drained, sandy soil. Cover the container with glass, plastic, or newspaper until the seeds begin to sprout.

PARTS OF THE LEAF of Deciduous Trees

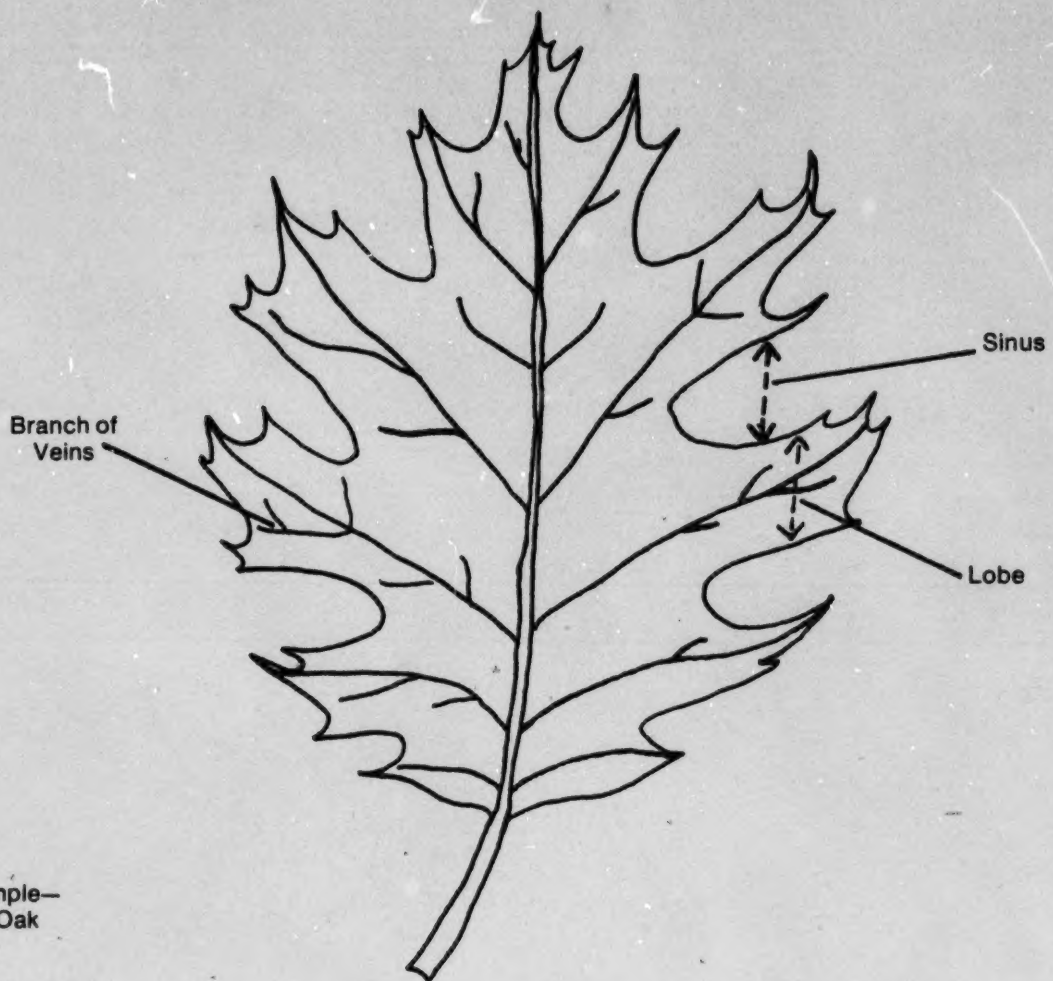
NAME _____



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PARTS OF THE LEAF of Deciduous Trees

NAME _____

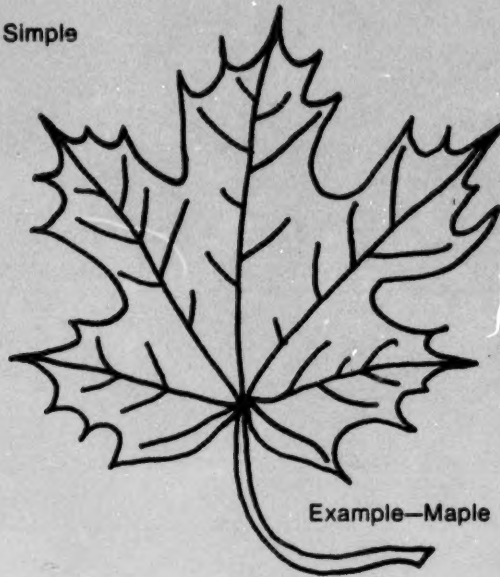


Example—
Red Oak

CLASSIFICATION OF LEAVES

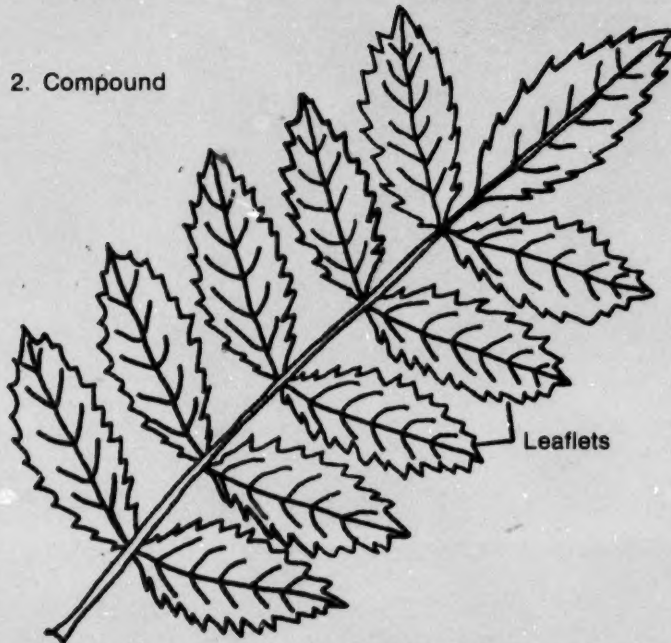
NAME _____

1. Simple



Example—Maple

2. Compound



Leaflets

Example — Staghorn Sumac

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CLASSIFICATION OF LEAVES by Arrangement on the Stem

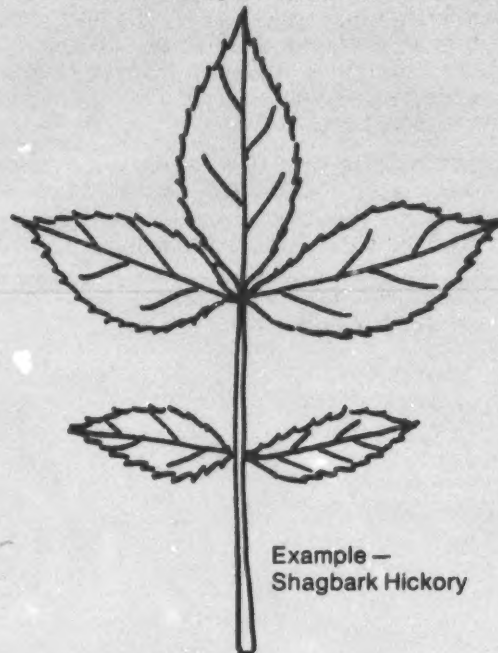
NAME _____

Palmately Compound



Example — Buckeye

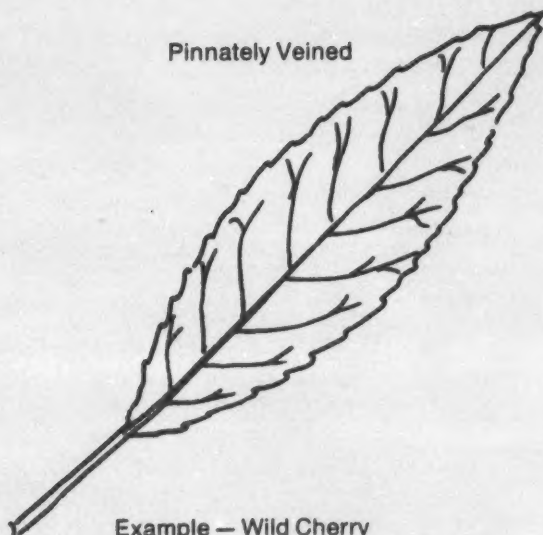
Pinnately Compound



Example —
Shagbark Hickory

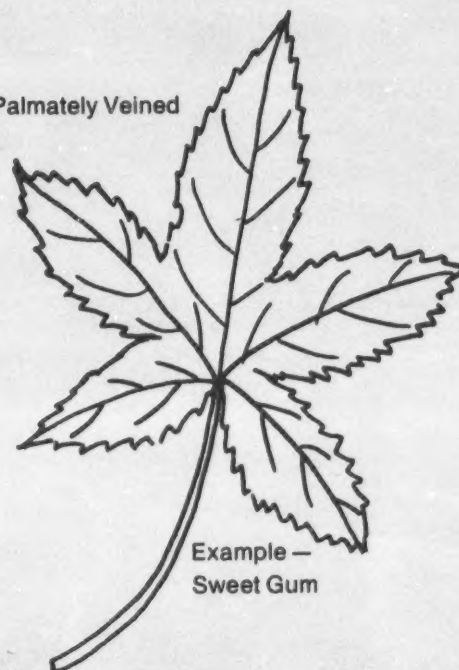
CLASSIFICATION OF LEAVES by Veination

Pinnately Veined



Example — Wild Cherry

Palmately Veined



Example —
Sweet Gum

DECIDUOUS TREES

NAME _____

There are many kinds of deciduous trees (trees that lose their leaves in winter) in the Outdoor Education Center. Before you can identify trees in the field, it is necessary that you have a good understanding of the similarities and differences between them.

You have studied how leaves are arranged on twigs, the parts of a leaf, and the different ways veins are arranged in the leaf. You understand such terms as pinnately compound, palmately compound, pinnately veined and palmately veined and now you are ready to put this information to practical use.

I. Instructional Objectives

A. When you complete the field activity, you will be able to distinguish between:

1. Simple and compound leaves
2. Pinnately and palmately compound leaves
3. Pinnately and palmately veined leaves
4. Leaves arranged in an alternate fashion on a twig as opposed to leaves arranged oppositely or whorled.

II. Procedure

In the activity sheets that follow, you are asked to compare pairs of trees that are found along the environmental site trails. Check the correct descriptions of each pair of trees. Space has been provided for you to write in your own comparisons. You may compare other things as well as leaves. When you have completed your work, ask your instructor to look at it and sign his name below.

Student _____

Has met the objectives of this activity.

Instructor _____

DECIDUOUS TREES

Pair Number _____

NAME _____

Name of tree _____ Leaf arrangement on twigs: Opposite..... ☐ Alternate..... ☐ Whorled..... ☐ Type of leaf: Simple..... ☐ Palmately compound..... ☐ Pinnately compound..... ☐ Veination of leaf: Pinnately veined..... ☐ Palmately veined..... ☐ Parallel veined..... ☐ Other observations: (your own) _____ _____ _____ _____ _____	Name of tree _____ Leaf arrangement on twigs: Opposite..... ☐ Alternate..... ☐ Whorled..... ☐ Type of leaf: Simple..... ☐ Palmately compound..... ☐ Pinnately compound..... ☐ Veination of leaf: Pinnately veined..... ☐ Palmately veined..... ☐ Parallel veined..... ☐ Other observations: (your own) _____ _____ _____ _____ _____
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DECIDUOUS TREES

Questions About Tree Pair # _____

1. In what ways are the two trees alike?

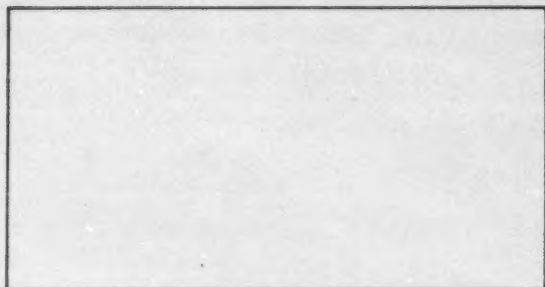
- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____

2. In what ways are the two trees different?

- A. _____
- B. _____
- C. _____
- D. _____
- E. _____
- F. _____
- G. _____
- H. _____

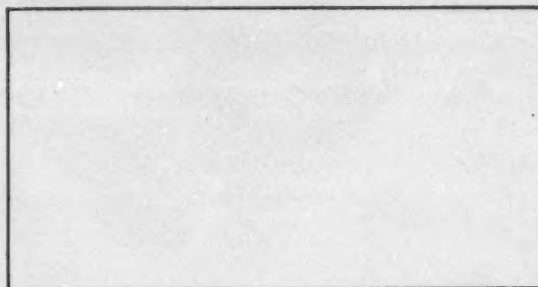
3. In the space provided below draw a picture of a leaf from the tree. Show the veins and how the leaves are arranged on the twigs.

Name of tree _____



4. In the space provided below draw a picture of a leaf from the tree. Show the veins and how the leaves are arranged on the twigs.

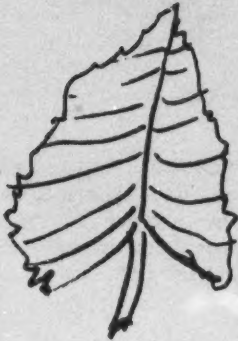
Name of tree _____



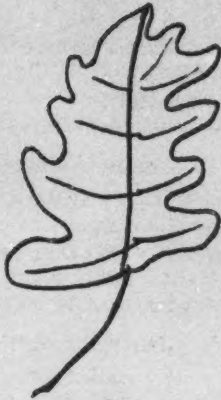
Student _____
has met the objectives of this activity.

Instructor _____

DECIDUOUS TREES



1.



2.



3.



4.



5.



6.



7.

Write the numbers of the leaves that are:

1. Simple _____
2. Palmately compound _____
3. Simple: alternately arranged on the twig _____
4. Compound _____
5. Pinnately veined _____
6. Simple: oppositely arranged on the twig _____
7. Palmately veined _____
8. Pinnately compound _____
9. Lobed _____

MEASUREMENT OF HORIZONTAL DISTANCE

In this lesson, a comparative approach to measurement is employed to evaluate three devices for measuring horizontal distance. Certain methods serve our needs better in different jobs and under different conditions. Other devices may be used and compared for effectiveness in doing particular measuring jobs.

I. Instructional Objectives

- A. The student will compare three methods of measuring horizontal distances and will list at least three advantages or disadvantages of each.

II. Concepts

- A. Horizontal distances may be measured by circular devices of known circumferences.
- B. The principle of measuring horizontal distances with a wheel is used by workmen on a highway and by persons measuring distances on maps.
- C. The odometer is an instrument for measuring horizontal distances along the surface of the earth.

III. Materials

Circular meter measure
Meterstick
Meter tape
Markers (wooden stakes, rocks, etc.)

IV. Learning Mode

The field activity is best carried out by student pairs in small groups of six. The vocabulary work should be completed in the classroom previous to the field activity. Classroom activities (below) may be used as follow-up to the field activity.

V. Classroom Activities

- A. Contact the local office of the State Highway Department to find out how distances are actually measured in building and maintaining a city or county road.
- B. Find out how an odometer works. Perhaps dismantle one from a junked bicycle and bring it to class.
- C. Through research, investigate the importance of the discovery of the wheel in the development of Civilization. Make a community survey to determine ways in which the wheel is used.

MEASUREMENT IN THE OUT-OF-DOORS

I. Measuring Horizontal Distances

When you are investigating the outdoor environment, you may wonder, "How far is it from here to there"? You may wish to determine the length of a slope or the distance between two trees, two buildings, or two cars. Any questions of "how far" can be answered through using one or more methods of horizontal measurement.

Highway engineers use *odometers* to determine the exact mileage between various locations along a route. Perhaps you have seen the odometer in your family automobile and the highway markers indicating distance to and distance between towns and villages.

A. Instructional Objectives

After doing the following activity, you will be able to compare three methods of measuring horizontal distances and to list three advantages or disadvantages of each.

B. Vocabulary

1. You will need to know definitions for the following terms:

- a. Pi (π) _____
- b. Circumference _____
- c. Diameter _____
- d. Horizontal _____
- e. Odometer _____
- f. Meter _____
- g. Centimeter _____
- h. Terrain _____

C. Materials

Circular meter measure
Meter stick
Meter tape
Markers (wooden stakes, rocks, etc.)

D. Ways of Measuring Horizontal Distances

1. Look at the wheel on your circular meter measure.

a. What ways can you think of to measure the circumference of the wheel?

b. Measure the circumference.

c. The circumference is _____ centimeters.

d. Why do you think there is a line on the outside edge of the wheel? _____

2. With a partner, and using the circular meter measure, the meter tape and the meter stick, measure a distance 15 meters long. Place markers at the beginning and end of the distance measured by each instrument.

a. Describe the condition of the terrain you are measuring. (Example: bumpy, muddy, grassy, rocky, etc.)

b. Was there any difference in the distance measured by each instrument?

Explain. _____

Circular meter measure _____

Meter stick _____

Meter tape _____

c. In your opinion, what are some reasons for the difference you found? _____

3. Which measuring device do you think would be best to measure the types of terrain listed below? Complete the table:

TERRAIN	INSTRUMENT	REASON
Muddy		
Stony		
High Grass		
Irregular (ruts, bumpy)		

4. Based on your observations and conclusions, list three advantages and disadvantages of each measurement method:

Circular Meter Measure	Meter Stick	Meter Tape
Advantages	Advantages	Advantages
1. _____		
2. _____		
3. _____		
Disadvantages	Disadvantages	Disadvantages
1. _____		
2. _____		
3. _____		

Student _____
Has met the objectives of this activity.

Instructor _____

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ECOLOGY LEVEL 5

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IDENTIFYING DECIDUOUS TREES BY USE OF KEYS

In this activity, the child learns how to use a key to identify deciduous trees in the Outdoor Education Center. A lesson in keying provides an interesting experience in grouping, sorting, finding sets and subsets.

I. Instructional Objectives

- A. The student shall successfully key out five trees in the O.E.C., using a dichotomous key designed for use in the O.E.C.

II. Learning Mode

The activity should be done in pairs or small groups of no more than six children. Each child is to have a key.

III. Procedure

- A. The three tree keys are numbered in order of difficulty:
Key # 1 — least difficult
Key # 2 — average
Key # 3 — most difficult

- B. Most of the trees on the keys can be found on the Hiking Trail at the NW corner of the Center.
- C. The trees are numbered for ease in identification by the instructor. (See list — TREES ALONG THE HIKING TRAIL.)
- D. The instructor should try to select trees with leaves easily seen by the students.
- E. Evaluation of students' work can be a check of the written responses on the key and verbal questioning of the student as to how he arrived at his answers.

IV. Classroom Activities

- A. Children may wish to make a key of their own using objects found in the classroom as subjects.
- B. Written and oral reports can be prepared as a result of researching some of the trees identified at the Center.
- D. The information in the keys may be used to write riddles or to make crossword puzzles.

THE ROCKY RIVER OUTDOOR EDUCATION CENTER

Trees Along The Hiking Trail Beginning At City Hall

- | | | | |
|-------------------------|-----------------------|-----------------------|-------------------------|
| 1. Swamp white oak | 33. Gray birch | 65. Black walnut | 98. Pin oak |
| 2. Pin oak | 34. Pin oak | 66. Sweet cherry | 99. Norway maple |
| 3. Silver maple | 35. Sweet cherry | 67. Sassafras | 100. Staghorn sumac |
| 4. Silver maple | 36. Pussy willow | 68. White ash | 101. Cut leaf maple |
| 5. White ash | 37. Wild black cherry | 69. Sugar maple | 102. Pin oak |
| 6. Red oak | 38. Apple | 70. Black walnut | 103. White oak |
| 7. Sugar maple | 39. Box elder | 71. Sugar maple | 104. American elm |
| 8. American beech | 40. American elm | 72. Sugar maple | 105. White ash |
| 9. White oak | 41. Black locust | 73. Black walnut | 106. American elm |
| 10. White ash | 42. Box elder | 74. Pin oak | 107. Apple tree |
| 11. American beech | 43. Staghorn sumac | 75. Catalpa | 108. Eastern cottonwood |
| 12. American beech | 44. Box elder | 76. American elm | 109. Eastern cottonwood |
| 13. Bitternut (pig nut) | 45. Box elder | 77. Sweet cherry | 110. Mulberry |
| 14. Cucumber tree | 46. Norway maple | 78. White pine | 111. Black locust |
| 15. Cucumber tree | 47. Wild black cherry | 79. Red maple | 112. Staghorn sumac |
| 16. Tulip poplar | 48. Sassafras | 80. Hawthorn | 113. Sassafras |
| 17. Sassafras | 49. White ash | 81. Black walnut | 114. Sour gum |
| 18. Sugar maple | 50. Wild black cherry | 82. White ash | 115. Sweet gum |
| 19. Shagbark hickory | 51. Sweet cherry | 83. Sweet cherry | 116. Black ash |
| 20. American linden | 52. Wild black cherry | 84. Wild black cherry | 117. White ash |
| 21. Shagbark hickory | 53. Sweet cherry | 85. Norway maple | 118. Staghorn sumac |
| 22. Pin oak | 54. Catalpa | 86. Black locust | 119. Mountain ash |
| 23. Tulip poplar | 55. Red maple | 87. Black locust | 120. Crab apple |
| 24. Muscle wood | 56. American elm | 88. Norway maple | 121. Hawthorn |
| 25. Black oak | 57. Butternut | 89. Norway maple | 122. American elm |
| 26. Pin oak | 58. White ash | 90. Wild black cherry | 123. Red maple |
| 27. White ash | 59. Sweet cherry | 91. Black locust | 124. Hawthorn |
| 28. White ash | 60. Wild black cherry | 92. Norway maple | 125. Willow |
| 29. Pin oak | 61. American elm | 93. Mulberry | 126. Quaking aspen |
| 30. American elm | 62. Mulberry | 94. Mulberry | 127. White ash |
| 31. Quaking aspen | 63. Black walnut | 95. Black locust | 128. Sour gum |
| 32. Red oak | 64. Mulberry | 96. Gray birch | 129. Eastern cottonwood |
| | | 97. American elm | 130. American linden |

KEY TO TREES OF THE OUTDOOR EDUCATION CENTER

Key # 1

LATE SPRING, SUMMER, FALL

NAME _____

1. Leaves needle like
 2. Leaves in bundles of two *Scotch Pine*
 2. Leaves in bundles of five *White Pine*
1. Leaves broad; not needle like
 3. Leaves pinnately compound
 4. Leaflets with pointed tips *Staghorn Sumac*
 4. Leaflets with rounded tips; trunk of tree thorny *Black Locust*
 3. Leaves simple; not compound
 5. Leaves palmately veined
 6. Leaves give off a milky sap where broken from the twig *Norway Maple*
 6. Leaves do not give off a milky sap where broken from the twig *Red Maple*
 5. Leaves pinnately veined
 7. Leaves irregular in shape
 8. Twigs with long thorns *Hawthorn*
 8. Twigs without long thorns; leaves with smooth margins but may have no lobes, one lobe, two lobes or three lobes. Young trees and branches are very green *Sassafras*
 7. Leaves having a characteristic uniform shape
 9. Margin of leaf with coarse teeth, Leaves rough to touch *American Elm*
 9. Margin of leaf with fine small teeth; leaf smooth to the touch *Wild Black Cherry*

Student _____
has met the objections of this activity

Instruction _____

KEY TO TREES OF THE OUTDOOR EDUCATION CENTER

Key #2

LATE SPRING, SUMMER, FALL

NAME _____

1. Leaves pinnately compound
2. Leaves with seven or less leaflets to a leaf
 3. Leaves with three to five leaflets to a leaf;
leaves arranged opposite on the twig *Box Elder*
 3. Leaves with seven leaflets (rarely more)
to a leaf *White Ash*
2. Leaves with more than seven leaflets *Staghorn Sumac*
1. Leaves simple; not compound
4. Leaves palmately veined
 5. Petiole (stem) of leaf gives off a milky sap
when broken from the twig *Norway Maple*
 5. Petiole of leaf does not give off a milky sap
when broken from the twig *Red Maple*
4. Leaves pinnately veined
6. Leaves triangular or irregular in shape
 7. Twigs with thorns *Hawthorn*
 7. Twigs without thorns
 8. Bark of trees white in older trees and
brown in very young trees; leaves
triangular in shape *White Birch*
 8. Leaves triangular in shape with a
flattened petiole at base of the leaf *Eastern Cottonwood*
6. Leaves not triangular or irregular in shape
 9. Leaves with five to seven bristle
tipped Lobes *Pin Oak*
 9. Leaves elliptical in shape
 10. Leaves smooth on top side *Wild Black Cherry*

Student _____
has met the objective of this activity.

Instructor. _____

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KEY TO TREES OF THE OUTDOOR EDUCATION CENTER

Key # 3

LATE SPRING, SUMMER, FALL

NAME _____

1. Leaves Compound
 2. Leaves pinnately compound; opposite arrangements on twigs
 3. Usually seven leaflets to a leaf *White Ash*
 3. Three to five leaflets to a leaf *Box Elder*
 2. Leaves pinnately compound, arranged alternately on twigs
 4. Grows 80 to 100 feet high; branches not fuzzy *Black Walnut*
 4. Rarely grows more than 20 feet high; branches fuzzy *Staghorn Sumac*
1. Leaves simple
 5. Leaves pinnately veined
 6. Leaves lobed
 7. Lobes have bristle like tips *Pin Oak*
 7. Lobes without bristle like tips *Mulberry*
 6. Leaves not lobed
 8. Veins of leaf are branched
 9. Leaves rounded not long in shape; margin of leaf often irregular *Mulberry*
 9. Leaves much longer than they are wide
 10. Leaves smooth on both top and bottom
 11. Teeth on leaf margin number about five for each centimeter *Sweet Cherry*
 11. Teeth on margin number about seven for each centimeter *Wild Black Cherry*
 10. Leaves much longer than side; rough to the touch on both the top and bottom
 12. Base of the leaf is uneven *American Elm*
 12. Base of the leaf is even *Hornbeam*
 8. Veins of the leaf are not branched; tree has horizontal stripes on bark *Black Birch*
 5. Leaves palmately veined
 13. Leaves deeply lobed; silvery white on underside *Silver Maple*
 13. Leaves not silvery white on underside *Red Maple*

Student _____
has met the objectives of this activity.

Instructor _____

MEASUREMENT OF VERTICAL DISTANCES

In these lessons, the concepts and operations learned are ones that can be carried over into children's out-of-door school play activities.

In order to use indirect measurement methods to determine vertical distances, pupils must apply the concepts of similar triangles, and measuring horizontal distances. They will also perform simple computations using the four operations of arithmetic.

Four different methods of vertical measurement are presented:

Cardboard Instrument Method
Tree-Felling Method
Muddy Water Method
Pencil Method

I. Instructional Objectives

- A. To use and compare a minimum of two methods of measuring heights (vertical distances) and to choose the method which is most accurate.

II. Concepts

- A. There are several indirect methods that can be used to measure heights when it is difficult to make a direct measurement.
- B. Similar triangles do not differ in shape but only in size.

III. Materials

Cardboard Instrument
20 M tape measure
Basin of Muddy Water
Sticks of various lengths

IV. Learning Mode

The activities are best done in pairs or in groups of three. Not all groups need to do all methods. Results may be tabled and compared in the field or later in the classroom.

V. Classroom Activities and Research

- A. Students may find out about other instruments used to measure vertical distances (heights). The forester uses an instrument called a Haga Altimeter and airplane pilots use another instrument also called an altimeter.
- B. Students may wish to devise other methods and instruments for determining heights of objects.
- C. Students may report on the mathematical field of trigonometry or read about the importance of triangles in the construction of Buckminster Fuller's geodesic dome.

MEASUREMENT OF VERTICAL DISTANCES

NAME _____

When working in the outdoor environment, it is often important to know the vertical distance or height of certain things such as trees, poles or buildings.

Why do you think this might be true?

There are many ways for you to measure vertical distances. Some are more accurate and useful than others. All of the ways use some form of mathematics. You will be using two or more of the following methods:

Cardboard Instrument Method
Muddy Water Method
Tree-felling Method
Pencil Method

I. Instructional Objectives

- A. After using and comparing a minimum of two methods of measuring heights

assigned to you, you will be able to choose the method which is most accurate.

II. Measuring Vertical Distances — Cardboard Instrument Method

A. Materials

Cardboard Instrument
20 M tape measure

B. Procedure

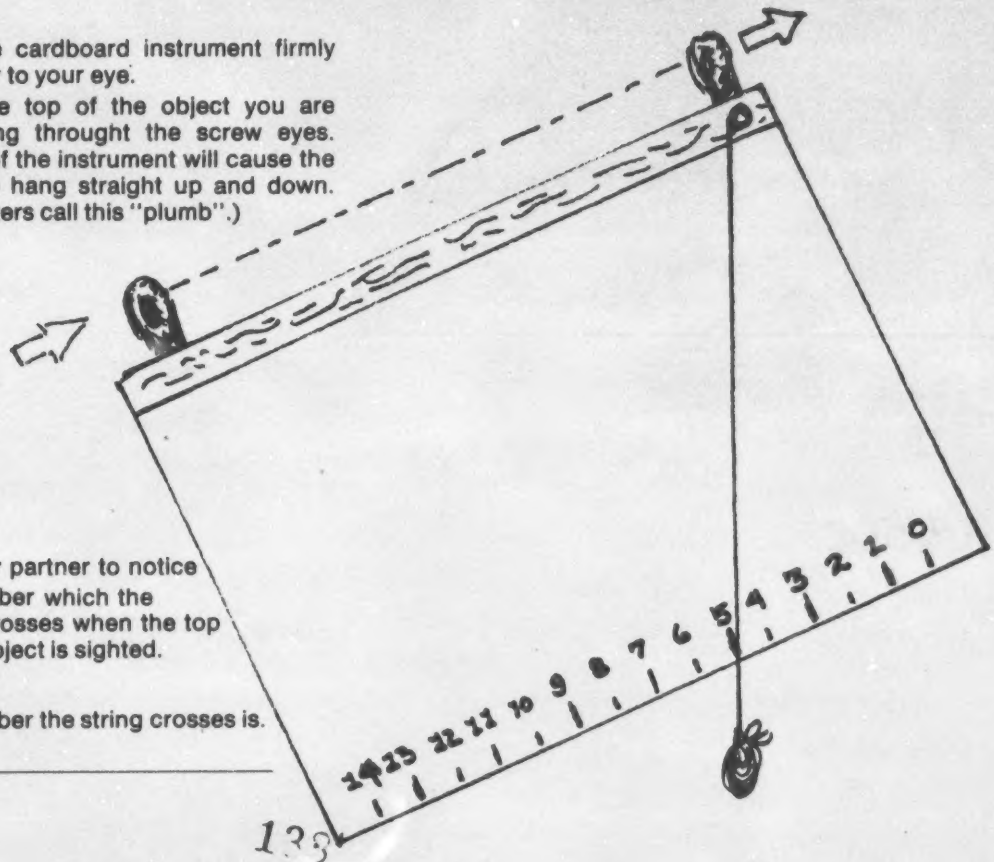
1. Hold the cardboard instrument firmly and near to your eye.
2. Sight the top of the object you are measuring through the screw eyes. The tilt of the instrument will cause the string to hang straight up and down. (Carpenters call this "plumb".)

5. Measure the horizontal distance from the object to the spot at which the reading was taken.

6. The distance is _____.

3. Ask your partner to notice the number which the string crosses when the top of the object is sighted.

4. The number the string crosses is.
- _____



7. Multiply the distance by the number on the instrument and divide the product by 10. To the answer, add the distance from the ground to your eye. The answer is the height of the object.

8. Show your calculations below:

9. The height of the object you measured is _____

III. Measuring Vertical Distances — Muddy Water Method

A. Materials

Basin of muddy water

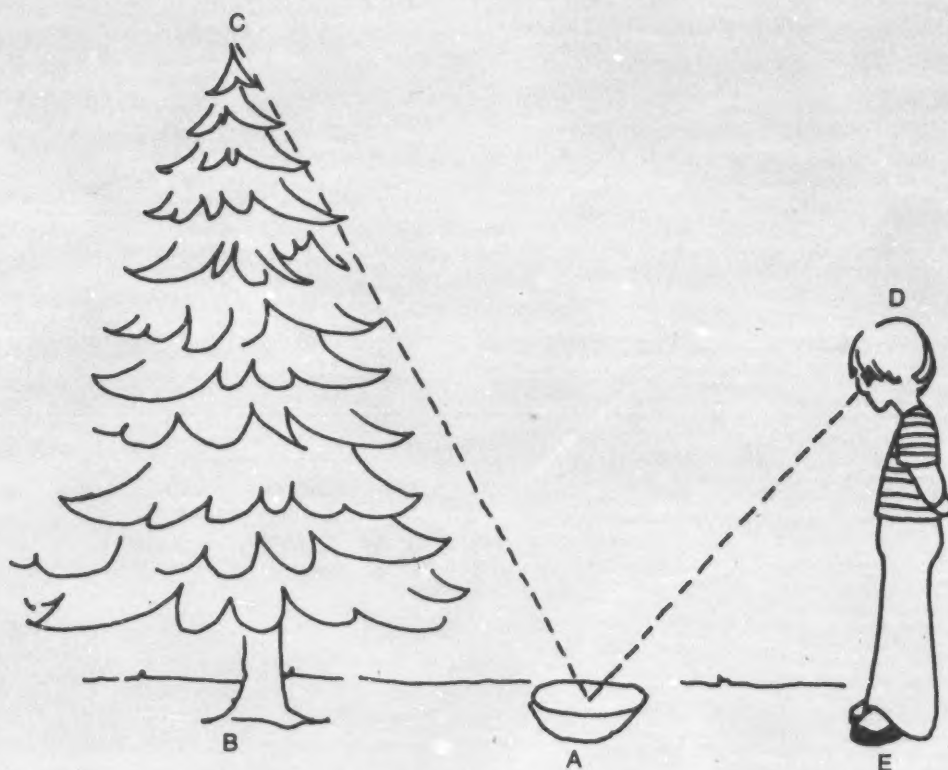
B. Procedure (This method works best on a sunny day.)

1. Place a basin of muddy water on the ground between you and the object you are measuring.

2. Step back from the basin a distance equal to the perpendicular distance from your eye to the ground. You should see the top of the object reflected in the water. If not, move the basin until this is possible.

3. The distance from the basin to the foot of the object is the height of the object.

4. The height of the object you measured is _____



When $AE = ED$, then $AB = BC$

IV. Measuring Vertical Distances — Tree-Felling Method

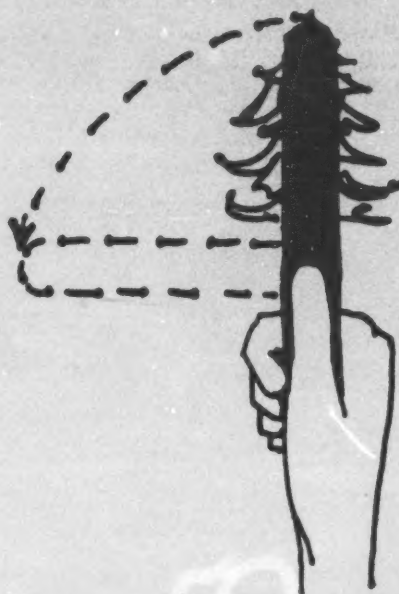
A. Materials

Stick
220 M tape measure.

B. Procedure

1. Stretch your arm out straight and hold a stick vertically in your hand.
2. Sight to the top of the object you want to measure; the tip of your stick should be even with the top of the object and your thumb should mark the bottom.
3. Move the stick 90 degrees to the left or right so that it is horizontal to the ground. Notice the point where the tip of your stick hits the ground, making sure that the foot of the object and your thumb still line up.
4. Ask your partner to stand at that point to mark it.
5. Now measure the distance from your partner to the foot of the object to find the height.

6. The height of the object you measured is _____



V. Measuring Vertical Distances — Pencil Method

A. Materials

Pencil or short stick



B. Procedure

1. Measure your partner's height and record it.
2. Your partner's height is _____.
3. Ask your partner to stand beside the object you are measuring.
4. Stand at a distance from him and hold a pencil or short stick at arm's length and sight across the top of the stick to the top of his head. (Point Y)

----- Y

----- X

5. Slide your thumb up or down on the stick until you are able to sight across the top of the thumb to his feet. (Point X) Keep the thumb at this position.

6. Raise the pencil upward until you can sight across the top of your thumb to point Y. Now sight across the top of the stick to a new point on the object.

7. Repeat until you have reached the top of the object by sighting.

8. Keep track of the number of times you measured the distance XY.

9. The height of the object is the above number X the height of your partner.

10. The height of the object you measured is _____

ECOLOGY LEVEL 6

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DECIDUOUS TREES

Leaf Hunt

In this activity the student makes an inventory of trees along the Hiking Trail of the Outdoor Education Center. He applies previously learned information about the types of arrangements of leaves on deciduous trees, records his information on a questionnaire, and constructs a histogram to represent the information collected.

I. Instructional Objectives

- A. The student will inventory an assigned group of trees in the Outdoor Education Center and will complete an activity sheet of information related to these trees.
- B. The student will construct a histogram showing the information gathered by the total class.
- C. The student will make verbal inferences as to why certain trees are damaged.

II. Learning Mode

The activity should be carried out in groups of six students, with each student responsible for investigating one kind of information about each tree.

III. Procedure

- A. In the classroom give the pretest on leaves studied at Level IV. If necessary, review the material before doing the field activity.

- B. Assign a different question to each of the six members of the group. The trees to be inventoried are numbered 0-75. The numbers begin at the Rocky River City Hall entrance to the Center.
- C. While on the Hiking Trail, help the children make the inferences included on their work sheet. Try to involve the thinking of each student.
- D. In the classroom, collate the information collected by each group of children that worked on the same question. Note any disagreements and help the children to speculate on why they might have occurred. The children are to plot the information on a histogram.

IV. Classroom Activities and Research

- A. Take a walk in or near your school yard. Pairs of students may play a game, "I See a Tree"; one student closes his eyes while the other student describes a tree, its bark, leaf arrangement, etc. The first student then tries to find the tree described. If tree keys are available, they may be used to identify the name of the trees.
- B. Students may tell a story about a tree using transparencies on the overhead projector, or student made slides.
- C. Several students may find out the state tree for each state and draw a picture of each on a large map of the U. S.

DECIDUOUS TREES

Leaf Hunt

In this activity you will make an inventory (or count) of some of the trees in the Outdoor Education Center that have certain characteristics. You will be using information you have previously learned about kinds of leaves, and their arrangement on twigs, and will be entering your information on an activity sheet and histogram.

I. Instructional Objectives

- A. You will inventory an assigned group of trees in the Outdoor Education Center and will complete an activity sheet of information about the trees.
- B. You will construct a histogram showing the information gathered by the entire class.

- C. You will make inferences concerning why certain trees along the Hiking Trail are damaged.

II. Procedure

- A. You will be assigned one or more questions to answer concerning characteristics of trees you will see along the Hiking Trail. Be sure to list the numbers of all trees that have the characteristic you are looking for.
- B. Using information gathered by others, complete the histogram so that it shows an accurate picture of the characteristics of the trees your class inventoried.

Questions

LEAF HUNT

- I. What trees numbered along the Hiking Trail have leaves that are pinnately compound? _____

- II. What trees numbered along the Hiking Trail have leaves that are palmately compound? _____

- III. What trees numbered along the Hiking Trail have leaves that are arranged alternately on the twig? _____

- IV. What trees numbered along the Hiking Trail have leaves that are arranged in an opposite pattern on the twig? _____

- V. What trees numbered along the Hiking Trail have leaves that are whorled in their twig arrangement? _____

- VI. What trees numbered along the Hiking Trail have leaves that are simple? _____

- VII. As you walk along the Trail, look for trees that you think might have been damaged by vines, fire, lightning, wind, man, or animals other than man.

What is their about the appearance of the tree that makes you think the damage was caused by one of the above reasons?

Student _____
Has met the objectives of this activity

Instructor _____

HISTOGRAM

NAME _____

Using your information and information gathered by others, complete the histogram so that it shows an accurate picture of characteristics of trees your class inventoried.

LEAF ARRANGEMENT OF TREES ON THE HIKING TRAIL

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
Trees with Leaves that are pinnately compound																
Trees with leaves that are palmately compound																
Trees with leaves that are alternately arranged																
Trees with leaves that are arranged oppositely																
Trees with leaves with a whorled arrangement																
Trees with simple leaves																

Student _____
has met the objective of this activity.

Instructor. _____

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A STUDY OF SOIL IN THE OUTDOOR EDUCATION CENTER

This is an investigation of soil in the Outdoor Education Center. Through this activity, the children learn that soil may differ in color, water absorption and composition in different parts of a relatively small area. The collection of soil samples is done at the Center and taken from various areas; most of the weighing, comparisons, analysis and inferences are done in the classroom. It is hoped that the learnings from this activity will be carried over to home gardening experiences.

I. Instructional Objectives

- A. To determine the difference in kinds of soil in different areas of the Outdoor Education Center by collecting samples and recording information.
- B. To measure the difference in the water holding capacity of soil by weighing samples and recording results in a data table.
- C. To measure the differences in the density of soil in different areas by weighing samples and recording results in a data table.
- D. To test samples of soil for acidity, using a soil testing kit.

II. Materials (To be divided among five groups)

- 2 Acid testing kits for soil
- 5 Soil sieve sets
- 5 Cottage cheese containers
- 5 Shovels
- 5 Balances
- 1 One cup measure
- 5 Graduated cylinders
- 5 Hand lenses
- 25 Baby food jars
- Rulers (supplied by students)

III. Learning Mode

This activity is best done in groups of no more than 5 students.

IV. Classroom Activities

- A. Collect samples of clay, humus, and sand and press firmly into cans that have holes punched at one end. Pour equal amounts of water into each can and observe the length of time it takes most of the water to run out of the cans. Draw conclusions about which kind of soil is most porous and which kind retains more water.
- B. Plant grass or bean seeds in soils of humus, sand, and clay. Give each plant equal amounts of water, light, and heat. Keep a record of plant growth and differences. How can the differences be explained?

A STUDY OF SOIL IN THE OUTDOOR EDUCATION CENTER

NAME _____

Have you ever noticed how some plants seem to grow better in some areas than in others? Often, this is due to the kind of soil in which the plants are growing. Different areas often contain different kinds of soil; some soils are more dense than others, hold different amounts of water, or are more acid than others. All these factors affect the growth of plants.

In this activity, you will have the opportunity to collect and examine samples of soil in different areas and make some inferences about the plants growing there.

I. Instructional Objectives

- You will be able to determine the difference in kinds of soil in different areas of the Outdoor Education Center by collecting samples and recording information.
- You will measure the difference in the water holding capacity of soil by weighing samples and recording results in a data table.
- You will measure the differences in the density of soil in different areas by weighing samples and recording results in a data table.

II. Soil

The formation of soils is a slow process. Initially, it begins with the breakdown of rock by wind, water, and temperature changes. This *weathering* of rock is only the first step in the formation of soil. The second step in the formation of soil begins when plants start to grow in the young soil and add decayed plant materials to the soil. This dead plant matter forms *humus*, a dark material which is part of the fully mature soil.

This addition of dead plant materials to the soil takes place only at the surface of the soil. This then becomes *topsoil*. Beneath the topsoil is the less fertile *subsoil* which lacks the humus so vital to plant growth. The top soil is distinctly darker than the subsoil; keep this in mind as you do the following activities.

III. Vocabulary — Define the following:

- Weathering _____
- Subsoil _____
- Humus _____
- Topsoil _____

IV. The top soil on our Outdoor Education Center changes considerably from one area to another. We would expect that it would be the same over the entire area.

- Can you infer why there might be such a difference in the soil in various locations at the Center?

- On the map attached to this activity, mark with a dotted line the area where you feel the top soil is the poorest. *Base your judgement on the types of plants growing in each area.* Do not consider that area which has been excavated for sewer line construction.

- Using a shovel, dig through the topsoil until you reach the subsoil. Do this in various areas of the site. You may need to make as many as ten or fifteen such tests.

On your map, determine the approximate location of each test. Mark these locations by letters A, B, C, D, E, etc.

- What is the depth of the topsoil in each area tested?

Area	Depth of Topsoil	Area	Depth of Topsoil
a.	_____	g.	_____
b.	_____	h.	_____
c.	_____	i.	_____
d.	_____	j.	_____
e.	_____	k.	_____
f.	_____	l.	_____

2. Describe how topsoil differs from subsoil. _____

3. On your map, again mark in the area with the least amount of topsoil. Use the information gathered in the above activity as a basis for your decision. *This time mark in the area with a solid line.*
- D. We have been told that at one time the topsoil from a portion of our site had been removed and sold. Do you think that this is true? _____
 Give a reason for your answer. _____

 Who would want to buy topsoil and why? _____

- E. We are now going to collect soil samples from five different areas of our site. We will need to take the following items into the field with us:
- 5 . . . empty cottage cheese containers with lids and marked 1,2,3,4,5.
 - 5 . . . screen sieve sets clearly marked 1,2,3,4, and 5.
 - 1 . . . one cup measure
 - 1 . . . ruler
 - 1 . . . shovel
- Your copy of the site map with locations 1,2,3,4, and 5 clearly marked.
1. Collect a cottage cheese container full of soil at each area marked 1 through 5. Make sure that the containers are marked properly for the site from which the sample was collected. Close each container and take it with you to your classroom for further study.
- F. Collect one level cup of soil from each sampling area 1 through 5. Place this sample in the sieve set container marked A. Make sure that you use the correct sieve set for each site and that the sieves are so arranged that the screen with the largest openings will be at the top and the screens with the smallest openings will be at the bottom. From top to bottom the sieves should be in an A,B,C,D,E, order.
1. Place exactly one cup of soil from each collection spot into the top container of the sieve set. Close and shake well in an up and down motion. *Do not empty the sieve set.* Take the complete set back to your classroom for further study.
- V. In the classroom we will now study the cottage cheese container of soil samples that we collected at the site.
- A. Which of the soil samples contains the greatest percentage of water? Can you suggest a way in which this can be determined? _____

- B. Let us try the following procedure for determining the percentage of water in each sample:
1. Weigh each of the cottage cheese containers of soil as soon as possible. (For best results, these samples should have been collected a day or so after a good rain.) Record the weight of the sample, including the weight of the container, in the data table that is provided. Do not weigh the lid! Keep the container open throughout this activity.
 2. Weigh each sample everyday until the weight does not change. We can then conclude that the sample is dry. You might help the drying process by stirring the soil but *make sure none of the soil is lost in the process.*
 3. Record the dates of each weighing and the results in the data table.

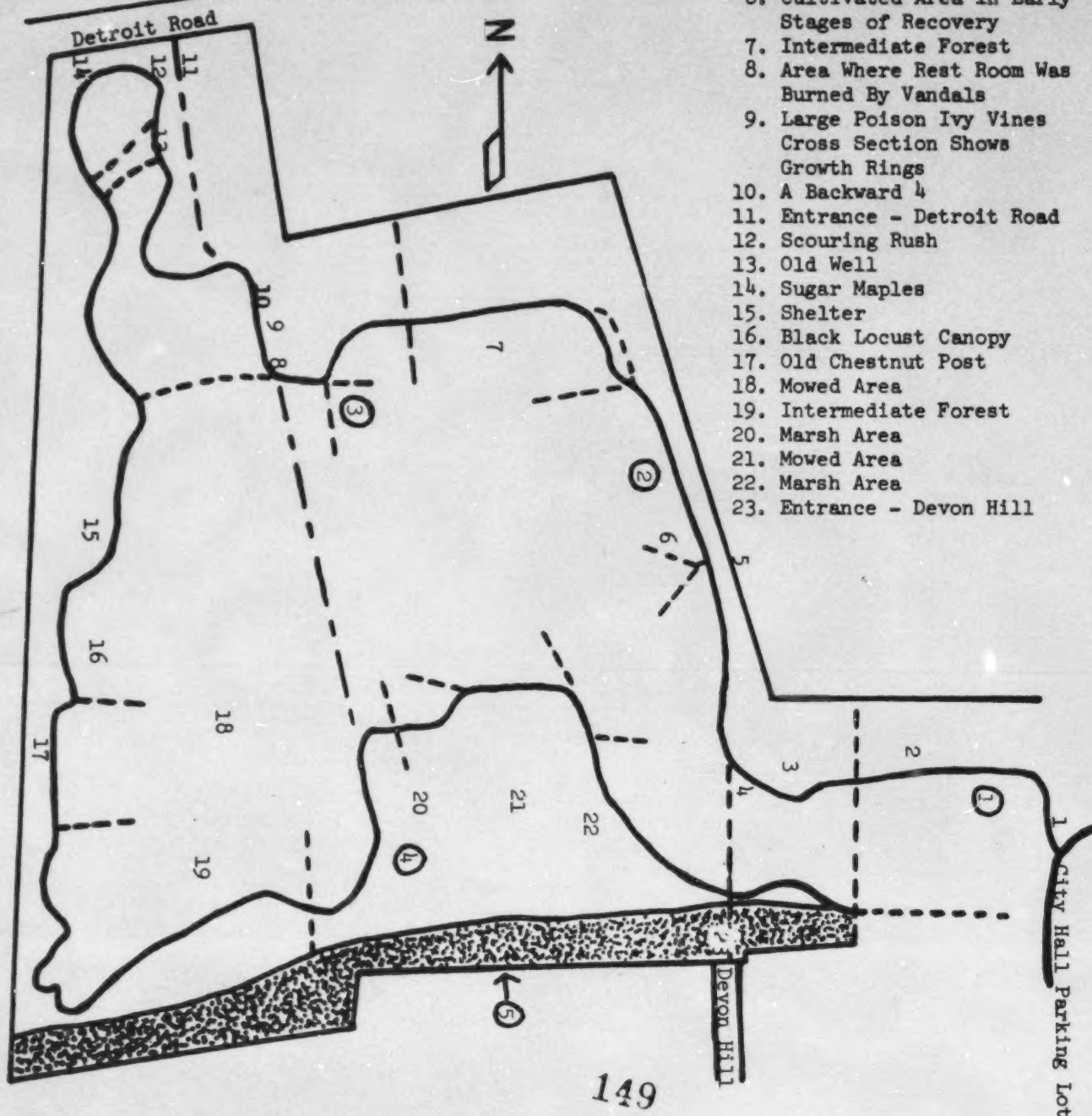
ROCKY RIVER CITY SCHOOL DISTRICT
OUTDOOR EDUCATION CENTER

Hiking Trail Map

-  Hiking Trail  Crossing Trails
 Sewer Easement  Road
 ① ② ③ ④ ⑤ - Soil Sampling Areas

AREAS OF INTEREST

1. Entrance - City Hall
2. Mixed Forest
3. Grape Vine Canopy
4. Intermediate Forest
5. Condominium Construction
6. Cultivated Area In Early Stages of Recovery
7. Intermediate Forest
8. Area Where Rest Room Was Burned By Vandals
9. Large Poison Ivy Vines Cross Section Shows Growth Rings
10. A Backward 4
11. Entrance - Detroit Road
12. Scouring Rush
13. Old Well
14. Sugar Maples
15. Shelter
16. Black Locust Canopy
17. Old Chestnut Post
18. Mowed Area
19. Intermediate Forest
20. Marsh Area
21. Mowed Area
22. Marsh Area
23. Entrance - Devon Hill



SOIL SAMPLE	WEIGHT OF SAMPLE IN GRAMS					
	Date _____	Date _____	Date _____	Date _____	Date _____	Date _____
1						
2						
3						
4						
5						

Which soil sample appears to have held the most moisture? _____

Let us now be more scientific about our above answer and calculate the percentage of water each sample held. Complete the following data table:

SOIL SAMPLE	FIRST WEIGHING IN GRAMS	LAST WEIGHING IN GRAMS	AMOUNT OF WATER LOSS IN GRAMS	% OF WATER HELD
1				
2				
3				
4				
5				

There are several ways to calculate the percentage of water each soil sample held. One way is to use the following ratio-proportion relationship.

$$\frac{\text{First Weighing in Grams}}{\text{Amount of Water Loss in Grams}} = \frac{100\%}{X}$$

Note! X = % of water originally in the sample

If you have not done this type of problem before, or if you have forgotten how to do them, your teacher will help you with your first calculation.

4. Which sample contained the greatest percentage of water? _____
5. Describe the soil in this sample.
 - a. color _____
 - b. texture _____
 - c. evidence of plant materials _____
6. Which soil sample contained the lowest percentage of water? _____
7. Describe the soil in the sample.
 - a. color _____
 - b. texture _____
 - c. evidence of plant material _____
8. Which of the soil samples would be the best for plant growth? _____
 Why? _____

9. Try to remember the types of plants that grew in the area where the soil in item #10 was collected. Describe the plants. _____

10. What types of plants grew in the area where the soil containing the lowest percentage of water was collected? _____

11. Which soil holds the most water — the soil from an area with a thick layer of topsoil or the soil from an area with very little topsoil? _____

Why? _____

VI. Studying the soil in the sieve sets.

- A. In your classroom, divide into five groups. Each group will work with one of the sieve sets. Give the sieve sets an extra number of shakes in the same vertical motion you used before.

Each group pours out the contents of each sieve onto a sheet of paper. Use a separate sheet of paper for each sample portion and be sure to label each sample portion A, B, C, D, or E.

Answer the following questions related to each sample portion.

1. Describe the texture of each portion of the sample. Rub the soil between your fingers for this test.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
2. Describe the color of each portion of the sample.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
- B. Weigh each portion of your sample and record the weights in the following data table.
- C. Using a graduated cylinder, determine the volume of each portion of your sample. Record this information in the data table.

- D. Determine the weight (mass) of each sample per cubic centimeter of soil. Do this by dividing the weight of the soil sample by its volume in cubic centimeters. Record your results in the data table.

Sample Portion	Weight (mass) in Grams	Volume in cc.	Weight (mass) per cubic centimeter
a			
b			
c			
d			
e			

- Which sample portion is the heaviest per unit volume?
- Which sample portion is the lightest per unit volume?
- Why do you think such a difference in weight per unit volume exists? _____
- Using a dictionary or a science book, look up the meaning of the word density. Give the definition in the space provided. _____

- E. Place one teaspoon of soil portion "A" into a baby food jar. Fill the baby food jar $\frac{3}{4}$ full of water. Repeat the procedure for soil portions B, C, D, and E. Close the jars and shake well. Let them stand for five minutes. Describe the results.

Portion A _____
Portion B _____
Portion C _____
Portion D _____
Portion E _____

- F. In the activity above, what portion of the sample had the most material floating on the surface of the water?

- Take out some of the floating material and observe it with a hand lens or under a dissecting microscope, if available. Describe the material. _____

- What do you think this floating material might be? _____
- Is this floating material something that is normally found in rich topsoil? Why? _____

- VII. We are now ready to compare the soils from all five of the areas. You will need to place all samples, clearly marked into groups. All A's in one group, all B's in another group, etc. Make sure the collecting points are indicated by 1, 2, 3, 4, etc.

- A. How are portions A the same? _____

- B. How are portions A different? _____

- C. Did any of the samples contain more small rocks than the others? If so, which sample?

Describe the rocks _____

What type of rock is it?

- D. Which collecting point sample contained the most sample portion "A"?
- E. Which collecting point sample contained the most sample portion "E"?
- F. If you had your choice of the soil sample 1 through 5 as a soil for a garden, which would you choose?

Why? _____

VIII. Using the soil samples in the cottage cheese boxes, test each soil sample 1 through 5 for the acid condition of the soil.

- A. To make these tests, use the soil testing kit. Follow the instructions on the kit. Record your results in the data table.

Sample area	Acid Condition	pH
1		
2		
3		
4		
5		

The numbers on the color comparison chart that is a part of the soil testing kit indicates the pH of the soil. A pH of 7.0 is neutral (it is neither acidic or basic). A pH reading of less than 7.0 means that the soil is acidic in nature; the lower the number the greater the acid condition. A number higher than 7.0 indicates that the soil is basic in nature.

The pH of a substance is actually an indication of how much replaceable hydrogen atoms are available. The greater the number of replaceable hydrogen atoms present, the more acid the soil.

- B. On pages 26 through 40 of the *Lamotte Soil Handbook*, a list of plants is given and their pH ranges for healthy growth indicated. According to this information, soil collecting sites would be best suited for the growing of the following plants if we only consider the pH.

Plant	Recommended pH range	Site Areas Best Suited for Growth
Tomato		
Cucumber		
Carrot		
Cherry Tree		
Blackberry		
Azalea		
Bittersweet		
Groundpine		
Black Locust		
Maple Tree		

- C. Most of our soils in Rocky River are too acid for healthy lawns and gardens. When a soil is acidic we say it is sour. How can such soils be sweetened?

Student _____
has met the objectives of this activity.

Instructor _____

**ECOLOGY
MINOR INVESTIGATIONS
LEVELS 4, 5 or 6**

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MINOR INVESTIGATIONS

The following minor investigations are related to the Outdoor Education Center. The general objective of each activity is to provide an opportunity for students to become aware of some of the natural ecological happenings. The investigations are designed so that groups or individuals may do several during a visit to the Center. Each investigation has instructional objectives and a space for teacher evaluation.

The following investigations include:

1. Open Ended Discussion Topics Related to the Outdoor Education Center
2. Insect Galls
3. A White Birch Grove
4. Poison Ivy
5. The Grape Vine
6. Comparing the Wild Grape Vines to the Vines of Poison Ivy
7. How plants Disperse Their Seeds
8. Life Beneath a Fallen Log

9. The Scouring Rush ←

(Should be done together)

10. The Field Horsetail ←

11. The Eastern Cottonwood

13. Non-green Plants

The learning mode for all minor investigations shall be that students will:

1. Work individually or in groups no larger than three.
2. Work at their own pace. A student may do several activities during one visit to the O.E.C.
3. Be supervised by one volunteer aide/ three students, when possible.
4. When possible, students should be permitted some latitude in selecting activities.

OPEN ENDED DISCUSSION TOPICS RELATED TO THE OUTDOOR EDUCATION CENTER

You may wish to use any or all of these discussion topics. This may be a good follow-up to an initial visit to the Center, which involves no less than two hours of hiking along the established trails.

I. Instructional Objective

- A. To enable students to interact with environmental problems related to the Outdoor Education Center through discussion.

II. Learning Mode

- A. The discussion is best done in small groups of six to eight children. It is suitable to Levels IV, V, & VI.

III. Procedure

- A. Small discussion groups may be formed with each group taking several questions to discuss within their groups. A leader and a note taker may be appointed or chosen by the group. After a short period of time (10-15 minutes), the teacher should call all groups together to share ideas. This activity can be concluded in ½ HOUR AND CAN BE USED at the end of a visit to the Center.

IV. Topics for Discussion

- A. Is science the only thing we can study at our Center?

- B. Vandalism has already been a problem at the site. What can be done by students and citizens to reduce such vandalism?
- C. If mini-bikes use the trails in our Center, would they have any effect on the ecology of the site? Should mini-bikes be permitted on the trails? Why or why not?
- D. If snowmobiles use the trails, would they have any effect on the ecology of our Center? Should snowmobiles be permitted on the site? Why or why not?
- E. What problems might we have if we put ponds in our Center?
- F. Should a building be constructed on our site? If so, what kind of building? What might be some of the ways in which it might be used?
- G. What would be the best way to use this site in the future? Should we keep it as an environmental area? Should we permit homes to be constructed on that area? Other ideas?
- H. What can we do to increase the number of different kinds of animals that might live on the site?
- I. How can students contribute to the care and development of the Center?
- J. What can be done about reducing the amount of poison ivy on the site? Why is there so much poison ivy at the Outdoor Education Center?

INSECT GALLS

NAME _____

I. Instructional Objectives

A. Through library research and field investigation, you will be able to make written inferences about the composition and characteristics of insect galls found in the Outdoor Education Center.

II. Procedure

Before you visit the Center, do some library research, and find out all you can about *insect galls*. Then answer the following questions:

A. Are all galls formed by insects? _____

B. What insects are responsible for galls? _____

C. Why does a gall form on a plant? _____

D. Where does the larva of the insect in the gall get its food? _____

E. The following galls can be; found on our environmental site.

Appearance	Approximate Size	Location (Plant)	Plant on Which it lives	Name of Gall
ball	1 inch	stem	goldenrod	goldenrod ballgall
ball	1/2 inch	leaf	oak tree	oak pill gall
ball	1-1/2 inch	leaf	oak tree	oak apple
clay lump	2 inches	stem	blackberry	blackberry knot gall
pine cone	1-1/2 inch	twigs	willow	pine cone willow

Source: Science and Children, Vol. 5, #1, September, 1967

F. How many different kinds of galls can you find on the environmental site? List the ones you found.

G. Make a classroom collection of one (no more) each of the different galls you find. Take these back to the classroom and "cut them open".

1. Is there a living insect larva in each gall? _____

2. If there was not a living insect larva in a gall when you opened it, what do you infer happened to the insect larva?

3. How could you determine if the insect larva was still in a gall before you opened it? _____

4. You might want to keep a few galls in a container that is covered. In time, the adult insect should appear.

***NOTE: Make sure you do not confuse a praying mantis egg case with a gall.

Student _____
Has met the objective of this activity.

Instructor _____

A WHITE BIRCH GROVE

NAME _____

I. Instructional Objectives

A. Through observing and comparing the plant growth in a white birch grove to that in surrounding areas, you will be able to make written inferences about why differences exist.

II. Procedure

Your instructor will take you to a grove of white birch trees. Use your powers of observation and make some "educated guesses" about the questions that follow:

A. At this point we have a cluster of white birch. Describe how the plant growth under these birches differs from the plant growth of the surrounding areas.

B. Why is there such a difference in the plant growth?

C. Some grass is growing under the white birches. How does this grass differ from similar grass that grows in an open area? (You may want to go to an open area and get grass samples for comparison.) _____

D. Why do you suppose this difference exists?

Student _____
Has met the objective of this activity.

Instructor _____

POISON IVY

LEAFLETS THREE ... LET — IT — BE!!!!

Poison ivy effects many people, but some individuals are not seriously effected by the plant. Even though you feel you are not effected by poison ivy, be sure you treat it with respect.

All parts of the poison ivy contain a heavy oil that causes an irritation to human skin. If the plant is burned, these oils are in the smoke and can effect individuals in all areas contaminated by such smoke.

No one should be effected by poison ivy if they recognize it and keep from touching it. In case you accidentally touch poison ivy, be sure to wash with plenty of good strong soap such as Fels Naptha.

I. Instructional Objectives

- A. Through observation in the field you will be able to identify the poison ivy plant and to infer where it might be found in Nature.

II. Procedure

- A. Your teacher will show you a poison ivy plant.

1. How would you describe it? _____

2. In the space below, draw a picture of the poison ivy plant.



3. Why is there so much poison ivy on the environmental site? _____

4. From what you observe, would you say that poison ivy grows best in shady or open areas?

Why? _____

Generally where poison ivy is found, a plant known as jewelweed, touch-me-not or quicksilver, can also be found. Your instructor will show you a jewelweed plant.

You can easily identify this plant by taking a cup of water to the site, put a leaf under the water and the surface will look like silver if it is jewelweed. You can also identify the plant, when seed pods are present, by squeezing the seed pod — they will explode in your hand. The flowers are small and are orange or yellow in color. They are a favorite of the hummingbird.

1. Why do you suppose the plant is called quicksilver? _____

2. Why do you suppose another name for the plant is touch-me-not? _____

3. Why do you suppose the plant is also called jewelweed? _____

4. Some people say that the sap of the jewelweed can be used as treatment for poison ivy. Do you believe this is true or is this just a myth? How would you find out? _____

Student _____
Has met the objectives of this activity.

Instructor _____

THE GRAPE VINE (WILD)

NAME _____

I. Instructional Objectives

- A. Through identifying the wild grape vine and observing its habits of growth, you will be able to infer why the plant might be desirable or undesirable in a forest area.

II. Procedure

Your instructor will show you places where wild grape vines are growing. As you observe these areas, attempt to answer the following questions:

- A. How do wild grapes differ from grapes that are grown by farmers for food? Try to remember a vineyard you have seen in Northern Ohio in making your comparison.

- B. How do you suppose a grape vine can climb a tree? Observe the trunk of a vine very closely and, if possible, the very end of the vines before answering this question.

- C. What animals do you think eat the grape fruit?

- D. What happens to the trees where the wild grape vines are growing? Carefully note what is happening to the tree trunks and tree tops before writing your answer.

- E. If the wild grape vines are permitted to grow without being cut, what do you feel would happen to a forest area?

- F. Would uncontrolled (no cutting) of growth of grape vines be good or bad for a forest area?

Why? _____

- G. Sometimes wild grape vines hang down from the top branches of trees and the vines do not touch the tree trunk. Infer how such vines get to the tree tops in the first place.

Student _____
Has met the objectives of this activity.

Instructor _____

COMPARING THE WILD GRAPE VINES TO THE VINES OF POISON IVY

NAME _____

I. Instructional Objectives

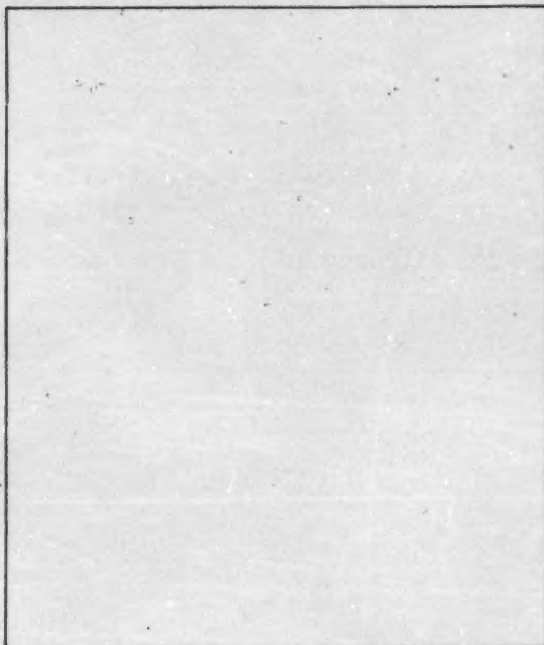
- A. By observing the wild grape vines and the vines of the poison ivy plant, you will be able to draw them and write how they compare in appearance and function.

II. Procedure

Your teacher will show you a wild grape vine and a poison ivy plant. After observing them carefully, do the following activity:

- A. Compare the leaves of a wild grape to that of poison ivy. How are they alike and different? _____

- B. In the spaces below, draw a picture of the leaves of the two vines. Be as accurate as you can.



Wild grape vine leaves

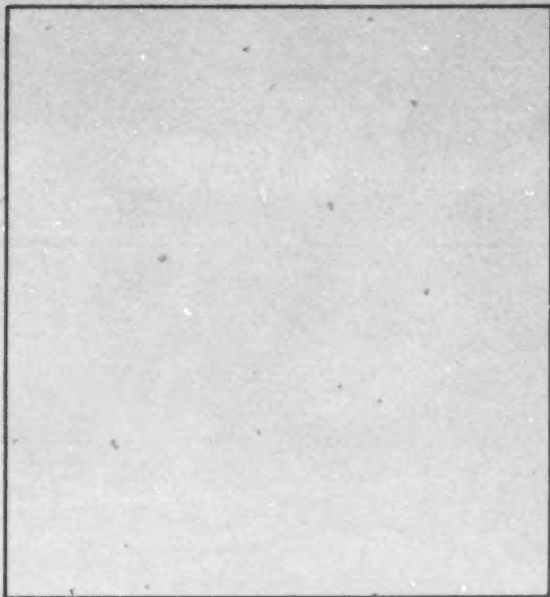


Poison ivy leaves

- C. If possible, compare the fruit of the wild grape to that of poison ivy. _____

- D. Compare the vines of the wild grape to those of the poison ivy. How are they alike and different? _____

E. In the spaces below, draw a picture of the two vines.



Wild Grape Vine



Poison Ivy Vine

F. Which vine do you feel does the most damage to the tree? Explain. _____

grape, that climb trees? If so, describe the vine and draw a picture of the leaf in the space provided. _____

G. At the Center did you notice any other vines, in addition to poison ivy and wild



Student _____
Has met the objectives of this activity.

Instructor _____

HOW PLANTS DISPERSE THEIR SEEDS

NAME _____

I. Instructional Objectives

- A. Through observing various plants and the characteristics of their seeds, you will be able to infer how the plant distributes its seeds.

II. Procedure

Your teacher will help you find some seeds as you walk through the Outdoor Education Center. Observe the seeds carefully and answer the following questions.

- A. There are three basic ways plants distribute their seeds. What are these ways?

- a. _____
- b. _____
- c. _____

- B. When you visit the Outdoor Education Center, make a classroom collection (one each) of all the seeds you can find. Determine how each seed is spread. _____

- C. Would the oak tree seed be distributed in the same way as a dandelion seed? Why? _____

- D. How do you think each of the following plants disperses its seeds?

- a. poison ivy _____
- b. cherry _____
- c. mulberry _____
- d. blackberry _____
- e. raspberry _____
- f. dandelion _____
- g. milkweed _____
- h. strawberry _____
- i. elm _____
- j. maple _____
- k. oak _____
- l. walnut _____
- m. burdock _____
- n. black locust _____
- o. dogbane _____
- p. jewelweed _____

- E. As you walk through the Center notice which six plants you find to be most abundant. List them below:

- F. Which of these plants spread their seeds by animals?

- G. How many of these plants spread their seeds by wind?

- H. How many of these plants spread their seeds by water?

- I. From your observations, what things about seeds help determine how they are dispersed? _____

Student _____
Has met the objectives of this activity.

Instructor _____

LIFE BENEATH A FALLEN LOG

NAME _____

I. Instructional Objectives

- A. By observing the kinds of life beneath a fallen, decaying log, you will be able to make some inferences about the special needs and characteristics of the plants and animals that live there.

II. Procedure

Near the Detroit Road entrance to the environmental site there are a number of fallen logs. They are in various stages of decay. Turn over several of these logs and investigate the types of living things you find there. Be sure to return each log to its original position so that the plants and animals beneath the log will not be disturbed or destroyed.

Answer the following questions related to your findings:

- A. How many different kinds of plants did you find? _____

- B. Describe the plants — are they green, white, etc.? _____

- C. How many different kinds of insects did you find under the log? _____

- D. Is there one insect that outnumbers all the others? _____

- E. Why do you think these insects make the area beneath the fallen log their home? _____

- F. What animals other than insects make their home under the fallen log? _____

- G. Are there any earthworms under the log?

Perhaps you remember learning about earthworms. If not, do some research and answer the following questions when you return to your classroom:

1. What do earthworms eat?

2. What supply of food would the earthworms have available under the log?

3. How do earthworms take in oxygen?

4. What conditions exist under the log that helps the earthworm take in oxygen?

Student _____
Has met the objectives of this activity.

Instructor _____

THE SCOURING RUSH

NAME _____

I. Instructional Objectives

- A. By examining and testing a powder made from the stem of the scouring rush, you will be able to infer the properties and substance of some commercial cleaning powders.

II. Procedure

Near the Detroit Road area of our Center, is a large growth of scouring rushes. This plant is often called the rough horsetail.



There is an often told story that scouring rushes were so named because the early pioneers picked this plant and, once dried, ground the stem into a powder. The resulting powder was used to clean pots and pans instead of soap.

- A. Describe the soil where the scouring rush is found. Is it dry, moist, etc? _____

Is the plant found growing on the higher ground surrounding the stand of rushes?

Why or why not? _____

- B. Do you feel there is any truth to the story about using these rushes for cleaning pots and pans?
- _____

1. Test your answer by actually trying to make such a powder and using it for cleaning. A mortar and pestle is available in your school for grinding.

Use no more than two plants per class for your tests.

Why?

2. After making a powder and testing it, do you now feel that it could be used as a cleaning powder?
- _____

3. Rub some of the ground powder between your fingers. How would you describe the texture?
- _____

What common substance has the same texture?

4. From what you now know about the scouring rush, what common substance is found in the stem? This substance is undoubtedly responsible for any cleaning properties of the scouring rush. _____
- _____

Student _____
has met the objective of this activity.

Instructor. _____

THE FIELD HORSETAIL

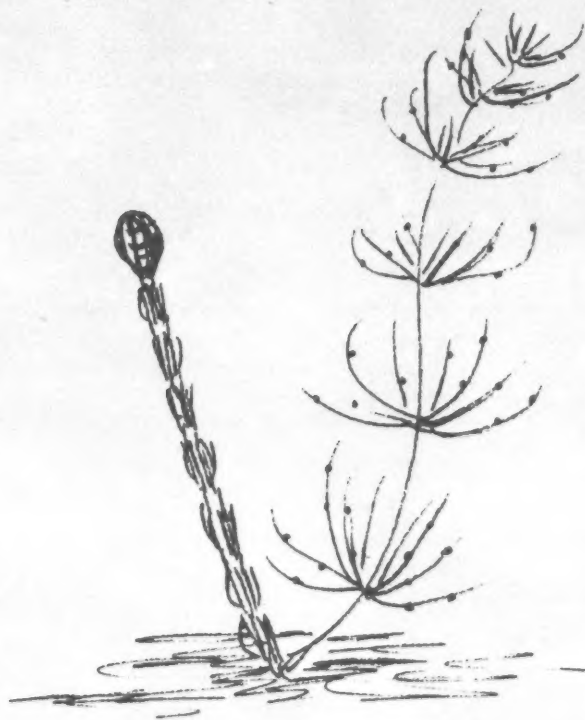
NAME _____

I. Instructional Objectives

A. By comparing the scouring rush to the field horsetail as to appearance and growing environment, you will list the similarities and differences you find.

II. Procedure

In the same area (near Detroit Road) where you found the scouring rush, you can find the field horsetail. This is another prehistoric plant that grew to great heights during the coal forming period of Ohio. Before you go to the site to examine the field horsetail, you should be sure that you can recognize the plant.



A. Is the field horsetail growing among the scouring rushes? _____

Is it growing on the banks surrounding the scouring rush growth? _____

What inference can you make as to the type of soil in which the field horsetail can grow? _____

B. Compare the field horsetail to the scouring rush.

1. How are they the same?

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

2. How are they different?

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

Student _____
has met the objective of this activity.

Instructor. _____

THE EASTERN COTTONWOOD

NAME _____

I. Instructional Objectives

A. Through observing the movement and structure of the leaves of the eastern cottonwood and other similar trees, you will be able to infer why the leaves move in the characteristic way that they do.

A. While at the site, compare the motion of the eastern cottonwood leaf to that of the white birch leaf as the wind blows through the trees. How would you describe the motion?

II. Procedure

There are many eastern cottonwood trees on the environmental site. Aspens, poplars, and cottonwoods are closely related. These trees quake and tremble in the wind making a characteristic rustling sound.

Prior to going to the Outdoor Education Center, make sure you can recognize an eastern cottonwood. Draw a picture of the leaf in the space provided below.



B. Examine a leaf from both trees very closely. Can you find something in the leaf structure that would cause the cottonwood tree leaves to quake and tremble the way they do?

Student _____
Has met the objective of this activity.

Instructor _____

NONGREEN PLANTS

NAME _____

I. Instructional Objectives

- A. Through classroom research and observation in the field, you will be able to identify a plant as a fungi.

II. Procedure

Before visiting the Outdoor Education Center, check the books available at your school. You will probably find a number of books that contain excellent pictures of common fungi. If your librarian will permit you, take these books to the site and attempt to identify the fungi you find.

Do not pick the fungi! We do not want to destroy any more of the plants than necessary.

III. Nongreen plants (Fungi)

The term fungi is commonly used for several groups of plants that lack chlorophyll and get their food from other living things (parasites) or from plant or animal remains that are no longer living (saprophytes).

Fungi do not produce seeds. Instead, most fungi produce spores that are spread from the parent plant by wind or water. Spores are tiny dust like particles that produce new fungi growth when they land in a place suitable for growth.

- A. Some examples of fungi you may see at the Center:

- B. How many different kinds of fungi did you find on the environmental site?

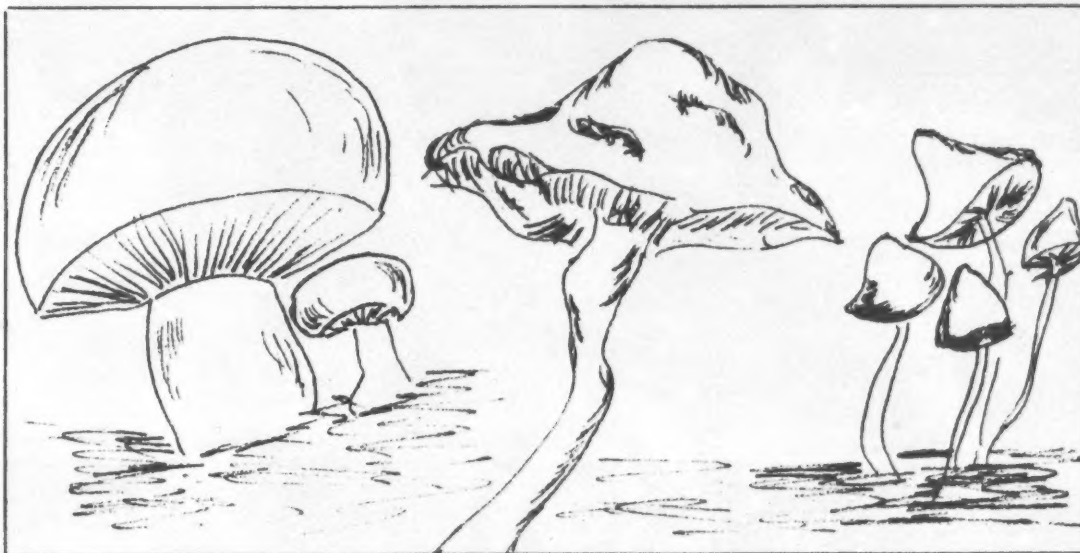
- C. Can you name any of the fungi you found? If so, list the identified fungi in the spaces below:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

- D. Where there more different kinds of fungi in the wooded areas or in the open areas?

- E. Why do you suppose the above is true? _____

- F. If you find a mushroom, examine a specimen closely. Where are the spores produced? _____



G. Are the mushrooms saprophytes or parasites?

H. A number of Ohio residents still pick certain wild mushrooms for food. Is this a good practice for the inexperienced person? _____

Why? _____

Student _____
Has met the objectives of this activity.

Instructor _____

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